

**Assess Nutrient Sources, Fluxes, and Water Quality of Ponds
within the
Kaloko-Honokohau National Historical Park**

Final Report

**Submitted to:
Hawaii-Pacific Islands Cooperative Ecosystem Studies Unit,
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Cooperative Agreement No. CA8000-AO-001
Task Agreement No. CA8052-AO-001**

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Programmatic Overview

Summary of Project. See Project Summary Section on pages 1-2 below

Project Purpose and Objectives. The purpose of the project is to assess the prevailing water quality conditions and the extent of natural variability over time, and under the variety of conditions experienced by these aquatic resources. This is intended to provide a better understanding of the context in which to view the potential influence of adjacent development activities on the aquatic resources within the park. Specific objectives for this cooperative agreement were to (a) determine the concentrations of oxygen, biologically important nutrients, chlorophyll *a*, and other diagnostic pigments in the anchialine pools and Kaloko and Aimakapa fishponds; (b) determine the salinity of the above systems in addition to wells and seek trends in the data that may reflect increasing withdrawal of groundwater from developments upslope of the park; (c) determine fraction of the dissolved nitrogen and phosphorus in the groundwater is biologically available, i.e., what fraction can be taken up by microorganisms and incorporated into biomass; (d) examine the concentrations of biologically important nutrients in wells in relationship to the release of these nutrients by developments upslope of the park; (e) determine the residence time of the water in the anchialine pools and in Kaloko and Aimakapa fishponds with inert tracers; (f) train park staff in the proper sample collection protocol and provide park staff with protocol recommendations for future long term monitoring.

Methods Employed. See details the **Methods** Section on pages 3-7 below. Additionally, the National Park Service contributed substantially to this cooperative effort by: (a) providing financial assistance, (b) providing necessary staffing to assist in the collection of water samples in the field, and (c) providing logistical and technical support to University personnel, participate with overall project, scheduling and management, and provision of materials, transportation, and equipment necessary to perform the project.

Project Accomplishments and Actions not Successfully Accomplished. An overview of the technical accomplishments and findings of the project are contained in the **Project Summary** Section in pages 1-2 below; these findings were fully responsive to objectives a, b, d, and f above. Objective c was partially accomplished to the degree that findings indicated that the dissolved nitrogen and phosphorous supplied by groundwater hydrological forces provided delivery of these nutrient substrates in excess of biological requirements. The bioassay experiments that were designed and implemented to expand insight on this matter were inconclusive, and omitted from this report. In practice, Objective e was found to be intractable in the aquatic body types within the Park. The time constraints of establishing uniform concentrations of a tracer throughout the various basin volumes violated an essential requirement for the subsequent calculation of decay rates of tracer concentrations to be used to yield residence times of the basins.

Conclusions and Lessons. A comprehensive documentation of the hydrographic and water quality conditions within the various aquatic resources within the Kaloko-Honokohau National Historical Park was obtained. This documentation, embraced prominent forms of natural variability, and provides a quantitative and statistically robust benchmark of these hydrographic and water quality conditions, and the strength of the groundwater hydrological forces influencing these conditions. In so doing the project provided a better understanding in which to view potential influences of adjacent activities on aquatic resources within the park.

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Project Purpose

The purpose of the project is to assess the prevailing water quality conditions and the extent of natural variability over time, and under the variety of conditions experienced by these aquatic resources. This is intended to provide a better understanding of the context in which to view the potential influence of adjacent development activities on the aquatic resources within the park.

Project Summary

This report summarizes work completed July 2004 - August 2006. Since notification of the award under CA8052-AO-001 on 28 June 2004, there have been nineteen surveys of the Kaloko-Honokohau National Historical Park (KAHO) site. These occurred on 22-23 July 2004, 29-30 September 2004, 15 December 2004, 12-14 January 2005, 23 February 2005, 15-16 March 2005, 27 April, 2005, 18 May 2005, 20 July 2005, 25 August 2005, 20 September, 2005, 21 October, 2005, 7 December, 2005, 11 January, 2006, 21 February, 2006, 11 April, 2006, 25 May, 2006, 30 June, 2006, and 1 August, 2006. Results from any surveys done in October 2006 are not included in this report; these will be contained in a compilation including quarterly samplings to be performed in 2007.

The samplings to date regularly included assessments of two residential wells, three test wells within the park boundary, six anchialine pools, seven stations within Kaloko pond and twelve stations within Aimakapa pond. These field assessments collected both hydrographic data and water quality samples from each of the above mentioned environments. Sampling of the wells intended to evaluate the quality of the hydrographic input to the Park's aquatic systems. The two residential wells were located makai (i.e., down-gradient) of residential housing but mauka (i.e., up-gradient) of existing/proposed industrial developments, and the three test wells were located seaward of existing/proposed industrial developments and Kaahumanu Highway.

The hydrographic data, consisting of temperature, pH, salinity, and dissolved oxygen, have been compiled together with the tidal condition prevailing at the time of collection. Water quality data consists of ammonium (NH_4), nitrate + nitrite ($\text{NO}_3 + \text{NO}_2$), phosphate (PO_4), silicate (SiO_2), total dissolved organic nitrogen (DON), total dissolved organic phosphate (DOP), and chlorophyll a. Station locations within the Aimakapa and Kaloko ponds were determined with GPS, and marked with floats throughout the project.

The surveys in 2004 were descriptive in nature. Station grids were laid out, GPS coordinates determined, and initial hydrographic and water quality data were taken synoptically from a number of station locations within the various aquatic environments. These data were used to identify prospective station locations, sampling and analytical strategies to be applied going forward that would most likely be most illustrative of general conditions within the park. The majority of the data reported in this analysis were collected from January 2005 to August 2006.

All aquatic habitats within the KAHO Park are significantly influenced by groundwater intrusion. The concentrations of the water quality parameters were typical of those found in other aquatic habitats in the Kona area that are similarly influenced by groundwater intrusion. All water quality parameters showed substantial temporal and spatial variability as reflected by the relative standard deviation values that approached 100% within any given water type and/or for any given parameter over the time of monitoring. This degree of variation reflects the sum of variability associated with the combination of proximity to groundwater intrusion, tidal cycles, seasons, biological activity, sampling, processing and analysis.

Conditions in the wells were the most uniform of any of the water types examined. Water quality concentrations in the well samples showed the lowest degree of temporal variation in the levels of the inorganic nutrients and hydrographic parameters. The down-gradient test wells within the KAHO boundary were significantly ($p < 0.05$) different in all parameters from the two residential wells. The thermal and pH characteristics were similar between the Kaloko and Aimakapa environments, and between the wells and pools. Kaloko fishpond is considerably more saline than Aimakapa and/or the anchialine pools within KAHO. Dissolved oxygen levels characteristically are at or near maximum saturation levels for all water body types. Nutrient levels are higher in the wells and pools for all parameters than those found in Kaloko or Aimakapa fishponds. In general, the water quality characteristics of all aquatic habitats within the KAHO boundaries appeared to be predominantly influenced by hydrologic forces driving the mixing of low-saline, high-nutrient groundwater and high-saline, low-nutrient seawater.

Introduction

Kaloko-Honokohau National Historical Park (KAHO), located on the Kailua-Kona coast of the Big Island, was established in 1978 for the preservation, protection and interpretation of traditional native Hawaiian activities and culture. Due to the dry climate (50-75 cm rainfall/ year) and the high porosity of the lava, there are no stream flows in the area. Freshwater enters/transverses KAHO and its various aquatic habitats as subterranean groundwater. This groundwater is characteristically of high inorganic nutrient content relative to the adjacent seawater with which it becomes admixed within the aquatic habitats of the Park. These habitats include anchialine pools, the Kaloko Fishpond which presents many of the physical characteristics of traditional ancient Hawaiian fishponds, and the Aimakapa Fishpond which has more restricted exchange with ocean waters and functions as an avian nesting habitat for native species.

Various existing and proposed development activities adjacent to and up-gradient from the Kaloko-Honokohau National Historical Park (KAHO) have created concern over potential effects of such developments to the quality of groundwater passing through the Park. The purpose of this project was to assess the prevailing water quality conditions within KAHO and the extent of natural variability within each over time for the purpose of better understanding the context in which to view the potential influence of adjacent development activities on the aquatic resources within the park.

To date, this project conducted nineteen water quality surveys within the KAHO site between July 2004 and August, 2006. These samplings included assessments of two residential wells, three test wells within the park boundary, six anchialine pools, seven stations within Kaloko pond and twelve stations within Aimakapa pond. These field assessments collected both hydrographic data and water quality samples from each of the above mentioned environments. Sampling of the wells intended to evaluate the quality of the hydrographic input to the aquatic systems within KAHO. This report summarizes the water quality findings from these surveys.

Methods

Maps showing the project site, location of the stations within Kaloko and Aimakapa fishponds, locations of the anchialine pools test wells within the park, and the two residential wells outside the park, are given in Figures 1 through 6 below. Station locations within the Aimakapa and Kaloko fishponds were selected both for broad coverage and to embrace the most extreme variations due to differences to groundwater input.

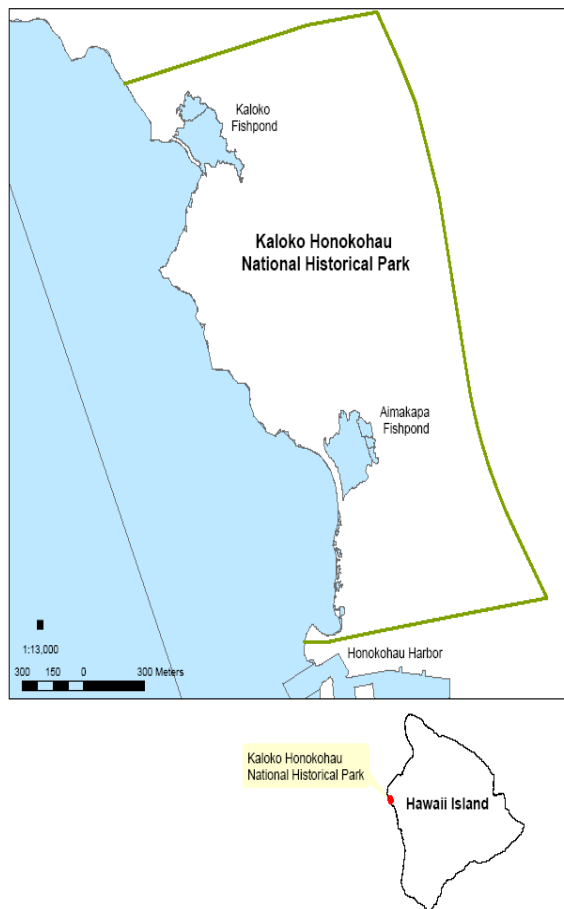


Figure 1. Project location.

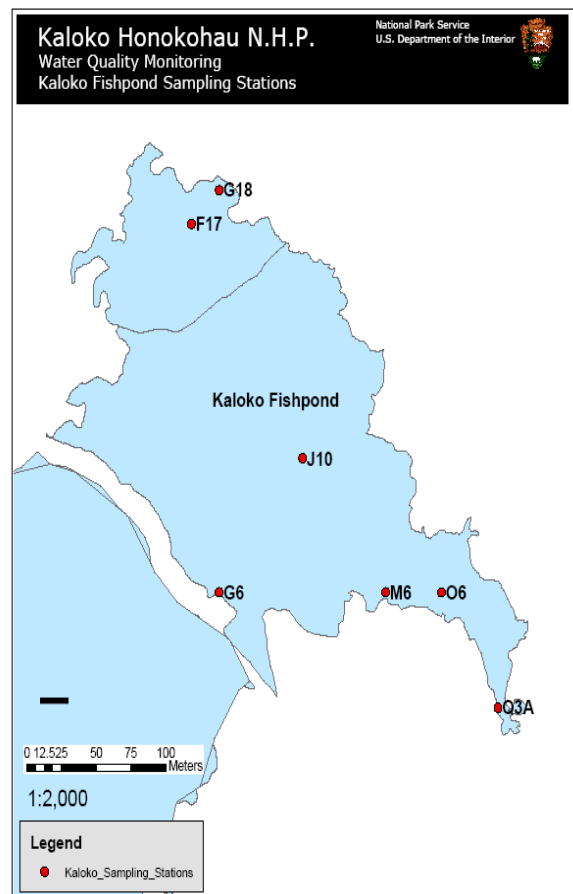


Figure 2. Kaloko fishpond station locations.

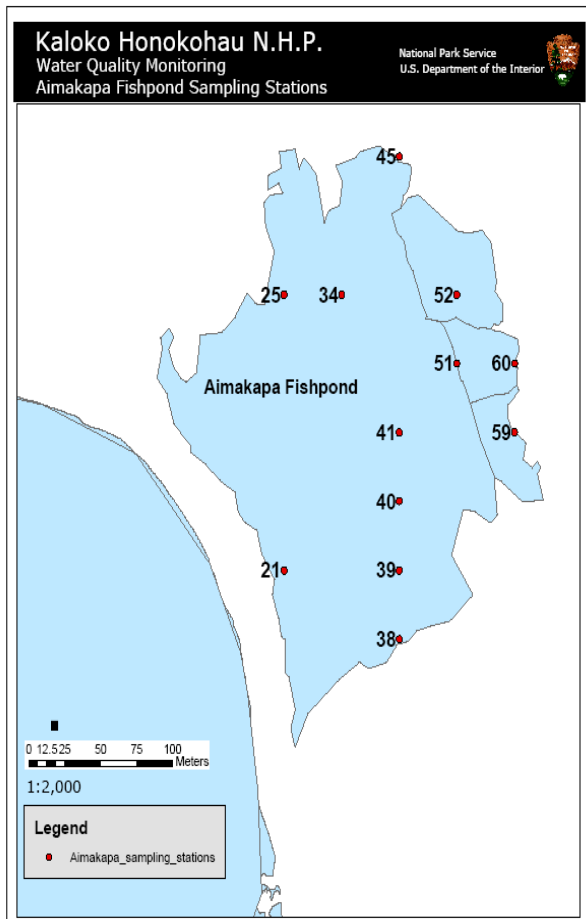


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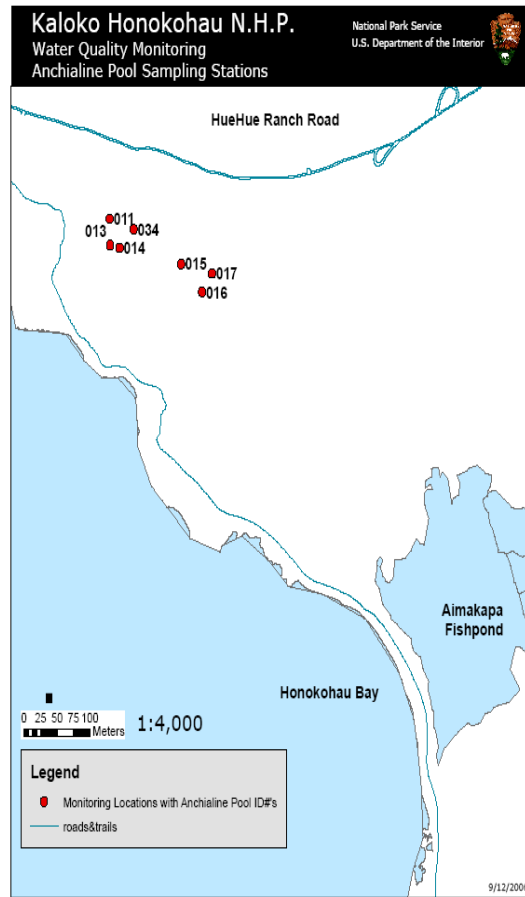


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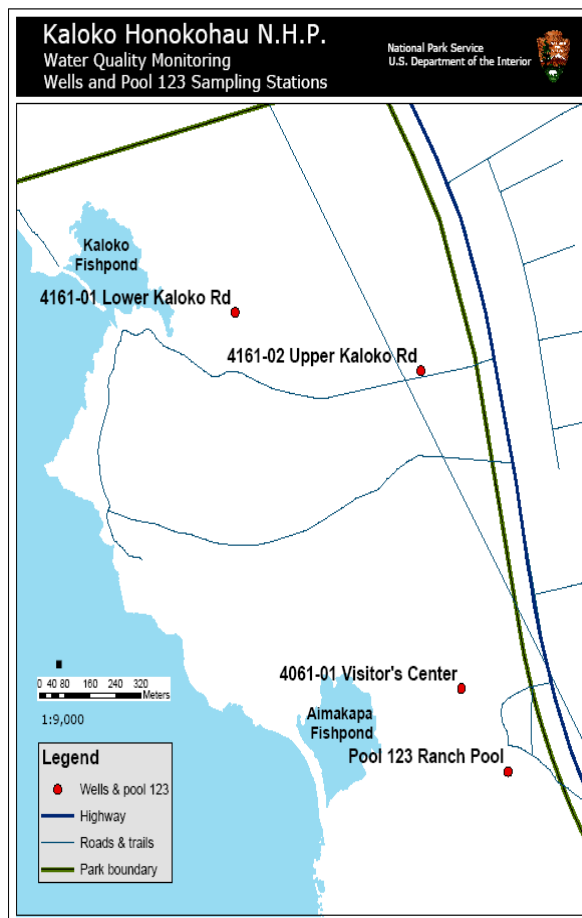


Figure 5. Test well locations within KAHO.

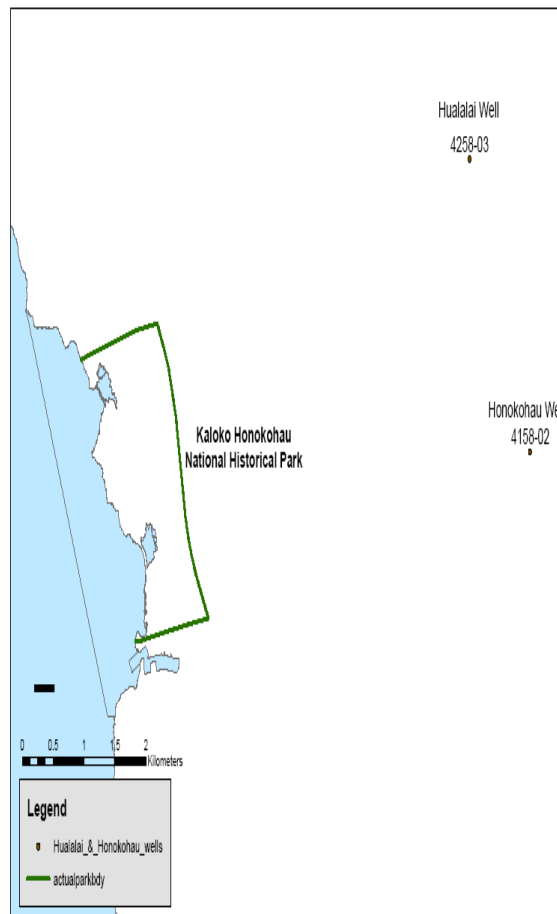


Figure 6. Residential well locations adjacent KAHO.

This project included nineteen surveys of the KAHŌ site. Samplings were done on a roughly monthly basis between January 2005 and August 2006. These occurred on 22-23 July 2004, 29-30 September 2004, 15 December 2004, 12-14 January 2005, 23 February 2005, 15-16 March 2005, 27 April, 2005, 18 May 2005, 20 July 2005, 25 August 2005, 20 September, 2005, 21 October, 2005, 7 December, 2005, 11 January, 2006, 21 February, 2006, 11 April, 2006, 25 May, 2006, 30 June, 2006, and 1 August, 2006.

These samplings regularly included assessments of two residential wells, three test wells within the park boundary, six anchialine pools, seven stations within Kaloko pond and twelve stations within Aimakapa pond (Figures 1-6). The field assessments collected both hydrographic data and water quality samples from each of the above mentioned environments. Immediately upon collection, samples were returned to the adjacent lab, filtered through GFF glass fiber filters, and frozen pending transport for analyses. Sampling was normally done in the morning to accommodate the staff work schedules.

Hydrographic parameters were measured with a Hach HydroLab Quanta Water Quality Monitoring System unit that was calibrated prior to each sampling. The hydrographic data, consisting of temperature, pH, salinity, and dissolved oxygen carry precision limits less than or equal to 0.1 °C, 0.1 units, 0.5 ppt, and 0.2 mg/L, respectively. Beginning in February 2005, two HydroLab units were used. Data were collected by two teams simultaneously going out to Kaloko Fishpond and anchialine pools, and Aimakapa Fishpond, anchialine pools, and wells. Occasionally wells and pool 123 were sampled on the following day to keep within the same tide and time frame. These hydrographic data have been compiled together with the tidal condition prevailing at the time of collection. The measurement quality objective performance standards for precision and systematic error are no less stringent than those suggested by marine-EMAP.

Water quality data consists of ammonium (NH_4), nitrate + nitrite ($\text{NO}_3 + \text{NO}_2$), phosphate (PO_4), silicate (SiO_2), dissolved organic nitrogen (DON), dissolved organic phosphate (DOP), and chlorophyll a. Nutrients were measured on filtered samples using a Technicon Auto Analyzer AAII according to standard methods outlined in Strickland and Parsons (1972) and Grasshoff (1983). Both DON and DOP were calculated as the difference between total dissolved fraction and the total dissolved inorganic fraction (i.e., $\text{TDN} - \text{NH}_4 - \text{NO}_3 = \text{DON}$, and $\text{TDP} - \text{PO}_4 = \text{DOP}$). The limit of detection for the dissolved nutrients is 0.5uM for DON, 0.05uM for PO_4 , 0.07uM for NH_4 , 0.10 for DOP, 0.10uM for NO_3 , and 0.5uM for SiO_2 . Chlorophyll a was routinely measured fluorometrically using the method outlined in Strickland and Parsons (1972); this carries a detection limit of 0.01 ug Chl a / L and a precision limit of 10%. In the statistical analyses, detection limits of the methods were used for samples with undetectable levels.

Sample collections from two freshwater wells serving residential communities and three mixohaline test wells within the park boundary were intended to evaluate the quality of hydrographic input to the Park's aquatic systems. The two residential wells were located down-gradient of residential housing but up-gradient of existing/proposed developments, and the three test wells were located seaward of existing industrial development and Kaahumanu Highway. The test wells were located roughly 0.25 – 0.75 mile from the coast, and were sampled at the expected surface of the wells which occurred at approximately 36' (Well No. 4061-01), 22' (Well No. 4161-01), and 54' (Well No. 4161-02); sampling depths of the two residential wells is unknown.

The nomenclature describing these wells (Figures 5-6) follows

Type	Name	Identifying No.
Residential	Honokohau	4158-02
Residential	Hualalai	4258-03
Test	Kaho Obs 1	4161-01
Test	Kaho Obs 2	4161-02
Test	Kaho Obs 3	4061-01

The sample collection, processing and analyses performed under this project included several quality control and assurance features. Written protocols were developed and communicated for station nomenclature, sampling, subsequent processing of samples at the time of collection as well as application of quality assurance assessments on the samples. Transfer of samples from Kona to Honolulu included use of Chain of Custody forms to formalize communication of the sample number, sample origin, and targeted analytes for various samples/origins. Based on variance results among parameters and/or water body types from the first three samplings in 2004, the sample processing protocols were established to filter all samples.

At each sampling occasion, additional QA/QC samples were collected from two stations in Kaloko and one station in Aimakapa fishponds for triplicate analyses of each chemical analyte. These data are compiled in Appendix C, and the cumulative QA/QC results are summarized in Table 9. Additionally, 10-20% of the routines samples were regularly subjected to replicate analyses.

An experiment was performed to demonstrate the absence of filtration effect on the observed concentrations of inorganic parameters (NH₄, NO₃, PO₄, SiO₂) over the range of concentrations encountered within the KAHO setting. The objective was to confirm that the act of filtration through Whatman 934AH glass fiber filters produced no significant effect on the measured concentrations of the various dissolved inorganic parameters being routinely assessed in this monitoring effort. Standard solutions of each analyte were prepared at two concentrations falling within the range normally encountered in the KAHO setting. For NH₄, NO₃, PO₄, SiO₂, the standard concentrations evaluated were 1 and 4 uM, 10 and 70 uM, 1 and 3 uM, and 5 and 30 uM, respectively. Five replicate samples of each analyte and concentration were filtered, subjected to chemical analysis per routine methods, and the calculated concentrations compared with paired samples that had not been filtered. Analysis of results via the Students t-test showed that for all parameters, the filtering samples produced no statistically significant different ($p < 0.05$) concentration values than unfiltered standard samples.

An experiment was performed to confirm the absence of systematic variation in the observed concentrations of various water quality parameters due to elapsed time (0 to 29 hours) between collection and filtration of samples maintained on ice in the dark. This was intended to confirm insensitivity of the analytical findings to modest variations in processing scheduling that might occur during the project. This study used a composite sample collected from the Kaloko fishpond, and the analytes included both the inorganic (NO₃, NH₄, PO₄, SiO₂) and organic (DON, DOP, chlorophyll) parameters. Four replicate samples were filtered (a) in the field immediately following collection, (b) after a 6 hour delay, and (c) after a 29 hour delay. Prior to filtration, the samples that were to be subjected to delayed processing were stored in a cooler on blue ice in the dark. Analyses of the results showed that under these storage conditions a delay in processing for up to 29 hours produced no significant ($p < 0.05$) change in the concentration of for any of the parameters.

Results and Discussion

Tables 1 and 2 show the mean values for all chemical parameters (given in units of μM and $\mu\text{g/L}$, respectively) from all sampling locations within each aquatic habitat. These data are derived from the full dataset contained in Appendix A. The relative standard deviation values (RSD) give quantitative expressions of the relative spatial variability within each type of water body. RSD results generally show lower values for the wells and pools than for the Kaloko and Aimakapa fishponds. The wells and pools uniformly reflect the predominance of hydrological forces, whereas the latter reflect a higher degree of spatial variability due to differences in mixing between groundwater and seawater. These results are shown graphically in Figures 7 – 13 below.

Tables 3 and 4 show the temporal mean nutrient values (in units of μM and $\mu\text{g/L}$, respectively) from each sampling location within each type of water body. In these tables, the RSD values provide measures of the degree of temporal variation at each location. These data are derived from the full dataset contained in Appendix A. The average concentrations of the oxidized nutrients among the stations reflect proximity to groundwater inputs to the Kaloko and Aimakapa fishponds.

Concentrations of the oxidized inorganic nutrients (i.e., nitrate, phosphate and silicate) followed the general pattern of wells > pools > Kaloko + Aimakapa (Fig. 7-9). Concentrations of the reduced inorganic nutrient (i.e., ammonium) followed the general pattern of pools < wells < Kaloko < Aimakapa (Fig. 10). The modestly higher ammonium levels in Kaloko and Aimakapa fishponds may in part be due to the inadvertent resuspension of sediments by large fish and/or the kayaks that were required for sampling these habitats. Levels of total dissolved organic nitrogen in the wells and pools were similar to one another, and generally greater than those in the Kaloko and Aimakapa environments (Fig. 11). The degree of spatial variability was generally higher in the Kaloko and Aimakapa environments than in the wells and pools for most parameters. This reflects the influence of sampling location in relation to groundwater nutrient input for these larger aquatic bodies, and the dominant influence of hydrographic rather than biological forces on the nutrient character of the wells and pools.

The levels of suspended phytoplankton, indexed by chlorophyll a concentrations, followed the pattern of Aimakapa > Kaloko > Anchialine pools. With the exception of the eutrophic pool #123, the chlorophyll concentrations in the anchialine pools were very low and approached detection levels of the method. This quantifies the condition of high water clarity that is typical of anchialine pools. To provide some insight on the composition of the phytoplankton assemblages, the concentrations of other plant pigments as well as chlorophyll a were measured via HPLC; these data are given in Appendix E. Correlation of chlorophyll concentrations as measured routinely by the fluorescence method and those measured via the HPLC method yielded a correlation coefficient of 0.93, indicating good agreement between the two approaches.

Table 1. Summary of Water Quality Results for sampling dates within the January 2005 - August 2006 period. Data reflect the means from all stations within the various water body types.
The RSD data (%) on any given sampling date describe the spatial variability within that type of aquatic resource. Source data are given in Appendix A.

Nitrate (uM)			1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/2005	8/25/2005	9/20/2005	10/21/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006
	Kaloko	MEAN	39.18	25.89	27.45	13.87	16.16	7.15	32.63	31.04	30.98	28.70	20.79	33.96	20.58	15.55	14.51	17.22
		RSD	107	133	67	103	101	183	41	26	38	64	80	65	93	89	81	136
	Aimakapa	MEAN	26.07	8.64	2.11	3.73	2.65	0.95	12.29	33.88	22.04	11.10	3.50	4.73	0.10	0.10	2.14	5.56
		RSD	112	192	228	70	71	80	121	97	122	124	82	117	0	0	256	150
	Pools	MEAN	156.59	119.01	92.63	69.45	101.03	95.47	81.11	112.80	76.73	94.84	91.30	95.26	78.52	47.40	59.94	91.59
		RSD	2	9	31	63	33	31	12	9	9	24	26	17	12	12	18	15
	Wells	MEAN	111.15	87.63	78.22	64.97	95.28	82.10	82.80	105.32	70.74	83.59	90.20	94.04	86.30	54.89	54.04	83.82
		RSD	21	52	25	24	16	21	36	42	20	28	14	14	17	20	25	21
		MEAN	1.81	1.66	1.81	1.05	0.68	0.87	1.96	2.40	2.10	1.66	1.53	1.75	0.67	0.70	1.86	1.45
		RSD	58	72	64	71	169	87	66	31	49	48	61	61	101	123	51	74
Phosphate (uM)	Aimakapa	MEAN	2.54	1.15	1.23	1.15	0.78	0.97	2.21	2.04	2.30	2.75	1.19	1.42	0.70	0.50	2.35	1.39
		RSD	38	26	28	27	11	19	47	41	37	40	20	30	47	17	59	78
	Pools	MEAN	2.72	3.36	3.74	3.92	3.88	3.91	4.69	3.87	3.79	3.66	3.67	3.95	3.81	NaN	4.38	4.24
		RSD	9	12	7	7	7	6	13	18	5	7	8	10	7	NaN	10	13
	Wells	MEAN	NaN	4.05	4.27	4.39	4.21	4.45	5.09	4.15	4.25	4.12	4.36	4.42	4.70	4.69	5.09	4.95
		RSD	NaN	6	5	6	8	8	7	9	9	10	8	7	9	11	7	4
	Kaloko	MEAN	256.57	393.23	394.37	234.97	472.50	282.73	383.60	474.37	455.40	363.77	345.97	446.03	436.80	404.97	397.23	442.27
		RSD	48	39	37	62	14	60	26	8	18	32	26	21	13	22	22	14
	Aimakapa	MEAN	498.87	477.60	484.90	494.62	476.93	587.03	518.07	571.70	549.52	551.28	501.37	496.18	443.77	455.73	516.75	466.33
		RSD	8	6	3	2	3	3	4	2	4	2	2	2	5	14	11	6
Silicate (uM)	Pools	MEAN	488.60	561.93	598.08	559.78	569.05	615.11	568.23	569.98	564.75	558.25	543.13	583.38	567.08	493.00	580.31	540.78
		RSD	3	7	3	2	1	2	6	2	3	3	2	3	2	4	6	6
	Wells	MEAN	650	687.7	757.4	667.08	673.6	701.4	696.76	699.00	689.72	675.56	697.16	712.48	706.8	598.35	648.35	653.64
		RSD	18	23	19	19	22	21	22	19	20	21	18	21	18	31	19	21
	Kaloko	MEAN	4.73	2.95	1.84	3.04	1.62	3.08	5.51	12.84	5.82	3.30	2.68	2.59	3.03	3.19	5.36	2.72
		RSD	69	25	27	81	30	80	31	37	17	37	53	60	56	27	16	15
	Aimakapa	MEAN	2.63	2.34	2.96	4.00	2.34	2.52	6.50	8.53	6.34	4.03	2.17	3.60	2.49	2.63	5.81	3.34
		RSD	26	33	60	38	39	41	25	56	24	50	34	55	20	39	42	53
	Pools	MEAN	2.12	2.45	3.04	3.56	1.88	3.00	5.42	6.15	4.99	2.69	2.48	2.12	4.22	3.79	3.90	2.68
		RSD	103	102	100	101	35	107	29	65	24	57	80	215	105	18	40	40
Ammonium (uM)	Wells	MEAN	1.13	0.93	1.16	1.65	0.79	1.24	3.30	1.72	3.80	0.94	1.33	0.13	0.76	1.03	1.63	0.5
		RSD	47	87	71	125	90	84	69	97	99	79	41	0	84	109	87	74
	Kaloko	MEAN	64.43	38.70	30.88	23.67	5.61	16.42	36.06	44.10	18.83	23.85	41.43	46.44	24.75	29.45	26.75	28.32
		RSD	108	88	74	65	145	16	26	24	48	59	46	76	42	60	54	63
	Aimakapa	MEAN	42.78	18.70	21.19	37.98	23.23	34.15	48.20	42.87	37.85	44.56	42.90	41.26	25.97	21.86	23.47	38.78
		RSD	56	23	30	26	19	15	24	26	55	14	9	41	18	28	25	39
	Pools	MEAN	193.82	155.48	110.21	154.34	12.97	52.38	118.41	85.71	36.71	79.44	111.21	57.15	62.24	96.13	60.06	128.20
		RSD	22	35	35	15	41	22	17	30	40	25	16	35	31	24	25	12
	Wells	MEAN	161.05	127.93	132.66	216.92	9.65	59.88	132.58	100.13	34.79	69.09	129.23	164.27	83.73	266.59	64.43	125.24
		RSD	30	24	39	35	51	28	15	27	35	44	22	18	39	35	55	21
TDON (uM)	Kaloko	MEAN	0.10	0.24	0.14	0.25	0.27	0.53	0.11	1.03	0.31	0.33	0.38	0.27	0.37	0.22	0.44	0.64
		RSD	78	67	95	33	14	26	163	11	111	40	77	37	9	28	63	42
	Aimakapa	MEAN	0.48	0.72	0.86	0.82	1.16	1.27	0.96	1.68	1.06	0.99	0.91	0.77	0.58	0.60	0.39	0.93
		RSD	60	19	20	14	8	10	75	27	72	44	9	40	14	24	66	22
	Pools	MEAN	0.08	0.13	0.00	0.00	0.08	0.36	0.00	1.27	0.01	0.04	0.03	0.00	0.08	0.15	NaN	0.19
		RSD	25	131	283	0	79	46	283	40	197	147	187	0	193	56	0	52
	Wells	MEAN	0.05	0.02	0.00	0.00	0.04	0.30	0.11	0.92	0.00	0.03	0.00	0.05	0.00	0.08	0.05	0.3
		RSD	0	127	0	0	148	61	200	48	0	143	0	224	0	159	137	102
	Kaloko	MEAN	1.13	3.94	3.36	2.62	14.43	10.27	6.93	3.29	3.00	2.80	8.07	5.09	9.90	7.30	19.48	26.42
		RSD	68	56	55	58	46	78	87	93	108	52	53	69	36	39	109	91
Chlorophyll (ug/L)	Aimakapa	MEAN	9.13	14.51	13.15	8.03	6.45	4.57	5.52	1.32	2.02	8.18	14.67	15.04	12.93	13.47	13.50	9.90
		RSD	81	23	53	44	20	24	67	92	71	50	31	41	15	19	53	42
	Pools	MEAN	0.20	1.24	0.17	0.68	0.34	1.63	0.31	0.08	0.39	0.24	0.29	0.12	1.03	1.07	1.77	4.20
		RSD	254	269	228	226	228	220	243	146	219	180	139	127	210	171	239	240

Table 2. Summary of Water Quality Results for sampling dates within the January 2005 - August 2006 period. Data reflect the means from all stations within the various water body types.
The RSD data (%) on any given sampling date describe the spatial variability within that type of aquatic resource. Source data are given in Appendix A.

			1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/2005	8/25/2005	9/20/2005	10/21/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006
Nitrate (ug/L)	Kaloko	Mean	548.54	362.44	384.30	194.16	226.17	100.05	456.75	434.49	433.67	401.82	290.99	475.39	288.05	217.68	203.10	241.08
		RSD	107	133	67	103	101	183	41	26	38	64	80	65	93	89	81	136
	Aimakapa	Mean	364.92	120.89	29.47	52.19	37.09	13.28	172.05	474.26	308.58	155.33	48.94	66.23	1.40	1.40	30.02	77.84
		RSD	112	192	228	70	71	80	121	97	122	124	82	117	0	0	256	150
	Pools	Mean	2192.23	1666.18	1296.75	972.30	1414.35	1336.60	1135.49	1579.20	1074.15	1327.69	1278.20	1333.68	1099.30	663.60	839.21	1282.26
		RSD	2	9	31	63	33	31	12	9	9	24	26	17	12	12	18	15
	Wells	Mean	1556.10	1226.75	1095.08	909.58	1333.92	1149.40	1159.20	1474.48	990.36	1170.23	1262.80	1316.56	1208.20	768.39	756.56	1173.48
		RSD	21	52	25	24	16	21	36	42	20	28	14	14	17	20	25	21
	Kaloko	Mean	56.16	51.31	56.01	32.55	20.93	27.07	60.71	74.25	65.05	51.56	47.43	54.15	20.62	21.70	57.53	44.95
		RSD	58	72	64	71	169	87	66	31	49	48	61	61	101	123	51	74
Phosphate (ug/L)	Aimakapa	Mean	78.77	35.62	38.26	35.68	24.05	30.20	68.36	63.14	71.38	85.25	36.99	43.87	21.55	15.40	72.75	43.09
		RSD	38	26	28	27	11	19	47	41	37	40	20	30	47	17	59	78
	Pools	Mean	84.36	104.08	115.79	121.64	120.16	121.30	145.31	119.89	117.45	113.54	113.65	122.53	118.19	#VALUE!	135.63	131.44
		RSD	9	12	7	7	7	6	13	18	5	7	8	10	7	0	10	13
	Wells	Mean	NaN	125.40	132.37	136.15	130.57	138.01	157.67	128.53	131.75	127.78	135.10	137.02	145.64	145.47	157.67	153.45
		RSD	0	6	5	6	8	8	7	9	9	10	8	7	9	11	7	4
	Kaloko	Mean	7183.87	11010.53	11042.27	6579.07	13230.00	7916.53	10740.80	13282.36	12751.20	10185.47	9687.07	12488.93	12230.40	11339.20	11122.40	12383.56
		RSD	48	39	37	62	14	60	26	8	18	32	26	21	13	22	22	14
	Aimakapa	Mean	13968.27	13372.80	13577.20	13849.27	13354.13	16436.93	14505.87	16007.60	15386.47	15435.93	14038.27	13893.13	12425.47	12760.53	14468.87	13057.24
		RSD	8	6	3	2	3	3	4	2	4	2	2	2	5	14	11	6
Silicate (ug/L)	Pools	Mean	13680.80	15733.90	16746.10	15673.70	15933.40	17223.20	15910.30	15959.44	15813.00	15631.00	15207.50	16334.50	15878.10	13804.00	16248.80	15141.84
		RSD	3	7	3	2	1	2	6	2	3	3	2	3	2	4	6	6
	Wells	Mean	18200.00	19255.60	21207.20	18678.24	18860.80	19639.20	19509.28	19572.00	19312.16	18915.68	19520.48	19949.44	19790.40	16753.80	18153.80	18301.92
		RSD	18	23	19	19	22	21	22	19	20	21	18	21	18	31	19	21
	Kaloko	Mean	66.24	41.28	25.69	42.51	22.73	43.12	77.16	179.76	81.48	46.18	37.52	36.19	42.44	44.62	75.02	38.08
		RSD	69	25	27	81	30	80	31	37	17	37	53	60	56	27	16	15
	Aimakapa	Mean	36.88	32.76	41.41	55.93	32.71	35.28	91.01	119.47	88.81	56.37	30.36	50.33	34.88	36.83	81.39	46.76
		RSD	26	33	60	38	39	41	25	56	24	50	34	55	20	39	42	53
	Pools	Mean	29.73	34.28	42.51	49.89	26.34	42.02	75.93	86.07	69.90	37.68	34.74	29.61	59.06	53.12	54.53	37.52
		RSD	103	102	100	101	35	107	29	65	24	57	80	215	105	18	40	40
TDON (ug/L)	Wells	Mean	15.75	12.95	16.21	23.13	11.06	17.39	46.14	24.02	53.26	13.19	18.68	1.82	10.61	14.35	22.88	7.00
		RSD	47	87	71	125	90	84	69	97	99	79	41	0	84	109	87	74
	Kaloko	Mean	902.04	541.80	432.34	331.43	78.49	229.88	504.82	617.42	263.55	333.92	580.00	650.16	346.52	412.28	374.54	396.48
		RSD	108	88	74	65	145	16	26	24	48	59	46	76	42	60	54	63
	Aimakapa	Mean	598.92	261.75	296.61	531.69	325.21	478.12	674.86	600.22	529.95	623.84	600.55	577.64	363.60	306.03	328.58	542.92
		RSD	56	23	30	26	19	15	24	26	55	14	9	41	18	28	25	39
	Pools	Mean	2713.54	2176.67	1542.99	2160.71	181.56	733.38	1657.71	1199.87	513.91	1112.11	1556.98	800.10	871.29	1345.76	840.80	1794.80
		RSD	22	35	35	15	41	22	17	30	40	25	16	35	31	24	25	12
	Wells	Mean	2254.70	1791.02	1857.27	3036.85	135.10	838.29	1856.18	1401.88	487.00	967.26	1809.16	2299.78	1172.25	3732.26	901.96	1753.36
		RSD	30	24	39	35	51	28	15	27	35	44	22	18	39	35	55	21
TDOP (ug/L)	Kaloko	Mean	3.15	7.39	4.34	7.85	8.42	16.53	3.41	31.83	9.61	10.23	11.78	8.47	11.57	6.69	13.55	19.84
		RSD	78	67	95	33	14	26	163	11	111	40	77	37	9	28	63	42
	Aimakapa	Mean	14.73	22.45	26.66	25.39	35.91	39.40	29.63	51.95	32.94	30.54	28.29	23.92	17.98	18.55	12.04	28.83
		RSD	60	19	20	14	8	10	75	27	72	44	9	40	14	24	66	22
	Pools	Mean	2.48	4.15	0.00	0.00	2.56	11.16	0.12	39.45	0.27	1.12	0.93	0.00	2.53	4.75	NaN	5.89
		RSD	25	131	283	0	79	46	283	40	197	147	187	0	193	56	0	52
	Wells	Mean	1.55	0.54	0.00	0.00	1.30	9.36	3.53	28.40	0.00	0.81	0.00	1.55	0.00	2.48	1.55	9.30
		RSD	0	127	0	0	148	61	200	48	0	143	0	224	0	159	137	102
	Kaloko	Mean	1.13	3.94	3.36	2.62	14.43	10.27	6.93	3.29	3.00	2.80	8.07	5.09	9.90	7.30	19.48	26.42
		RSD	68	56	55	58	46	78	87	93	108	52	53	69	36	39	109	91
Chlorophyll (ug/L)	Aimakapa	Mean	9.13	14.51	13.15	8.03	6.45	4.57	5.52	1.32	2.02	8.18	14.67	15.04	12.93	13.47	13.50	9.90
		RSD	81	23	53	44	20	24	67	92	71	50	31	41	15	19	53	42
	Pools	Mean	0.20	1.24	0.17	0.68	0.34	1.63	0.31	0.08	0.39	0.24	0.29	0.12	1.03	1.07	1.77	4.20
		RSD	254	269	228	226	228	220	243	146	219	180	139	127	210	171	239	240

Table 3. Summary of Temporal Mean Values for all Water Quality parameters over the January 2005 - August 2006 survey period.
RSD (%) values give an expression of the degree of variation over time. Source data are given in Appendix A.

		NO3		PO4		NH4		SiO2		TDON		TDOP		Chl a	
		Mean(uM)	RSD	Mean(uM)	RSD	Mean(uM)	RSD	Mean(uM)	RSD	Mean(uM)	RSD	Mean(uM)	RSD	Mean(ug/L)	RSD
Kaloko Fishpond	F17	4.97	85	0.60	73	3.64	60	378.58	26	19.20	10	0.39	66	7.07	94
	G6	17.37	77	0.99	61	4.82	88	244.99	49	21.85	66	0.35	71	7.92	137
	G18	7.10	132	0.64	54	4.13	66	430.89	20	15.20	46	0.38	75	8.33	71
	M6	29.63	51	1.53	52	4.35	93	330.95	39	40.50	56	0.30	87	5.55	90
	O6	19.51	82	1.45	63	3.88	71	369.01	33	24.18	62	0.40	89	8.99	197
	Q3	19.26	72	1.72	55	4.28	62	515.58	11	35.43	76	0.22	120	4.11	171
	J10	6.77	111	0.76	50	3.12	42	350.77	30	19.20	10	0.43	42	20.15	81
Aimakapa Fishpond	21	1.36	133	1.16	74	5.22	97	516.60	12	28.66	47	0.97	53	11.78	49
	25	1.17	109	1.23	62	5.33	106	514.17	12	28.38	40	0.94	48	11.20	55
	34	2.22	164	1.31	56	5.08	91	525.53	10	30.40	40	0.95	46	10.32	60
	38	1.39	132	1.36	64	5.29	93	513.35	12	32.85	40	0.99	56	9.47	48
	39	2.03	149	1.34	62	5.23	89	512.37	12	33.91	44	0.99	57	11.22	46
	40	3.14	178	1.49	64	5.65	101	499.85	13	31.57	42	0.98	45	10.45	51
	41	4.53	190	1.47	57	5.04	100	511.65	9	29.57	34	0.91	45	9.79	70
	45	18.66	152	2.23	54	6.42	80	534.45	9	40.06	58	0.60	63	7.99	71
	51	10.19	171	1.76	64	4.61	113	513.45	10	32.68	45	0.68	58	9.34	64
	52	16.13	102	1.87	44	3.91	89	521.12	9	26.26	50	0.64	55	8.20	41
	59	17.91	130	2.44	58	5.68	67	519.68	10	39.97	44	0.74	57	6.03	99
	60	18.94	122	2.31	53	4.50	81	512.57	10	33.83	40	0.56	76	7.50	111
	11	76.57	21	3.56	12	3.84	61	543.06	7	85.40	65	0.18	181	0.18	143
Pools Anchialine	13	84.32	16	3.79	12	2.45	76	552.65	6	97.84	59	0.16	249	0.21	164
	14	103.10	22	3.94	15	2.03	70	565.83	5	104.32	59	0.09	175	0.25	126
	15	96.39	33	4.01	12	2.95	70	573.24	7	97.06	66	0.16	217	0.10	117
	16	88.29	23	4.07	12	2.31	69	576.16	6	96.96	54	0.15	234	0.03	120
	17	91.16	25	3.96	15	2.51	63	578.73	5	104.87	62	0.19	222	0.10	183
	34	100.63	23	3.92	12	2.37	91	565.95	6	96.74	58	0.19	198	0.03	115
	123	88.27	47	3.53	17	7.91	43	569.98	7	123.48	74	0.20	106	10.10	220
Wells (Residential)	W4258-03	66.77	17	4.47	6	0.92	126	832.61	5	117.84	67	0.19	156	n.d.	n.d.
	W4158-02	82.68	28	4.20	8	0.25	113	838.95	5	148.61	60	0.31	315	n.d.	n.d.
	Wells 4061-01	74.60	29	4.31	14	2.55	91	535.90	6	98.28	69	0.13	248	n.d.	n.d.
	(Test) 4161-01	81.56	32	4.50	8	1.81	86	630.40	7	93.65	62	0.13	276	n.d.	n.d.
	4161-02	106.22	22	4.92	7	1.38	85	617.79	7	127.56	52	0.10	217	n.d.	n.d.

Table 4. Summary of Temporal Mean Values for all Water Quality parameters over the January 2005 - August 2006 survey period.
 rsd (%) values give an expression of the degree of variation over time. Source data are given in Appendix A.

		NO3		PO4		NH4		SiO2		TDON		TDOP		Chl a	
		Mean(ug/L)	RSD	Mean(ug/L)	RSD	Mean(ug/L)	RSD	Mean(ug/L)	RSD	Mean(ug/L)	RSD	Mean(ug/L)	RSD	Mean(ug/L)	RSD
Kaloko Fishpond	F17	69.63	85	18.50	73	50.95	60	10600.18	26	268.80	10	11.95	66	7.07	94
	G6	243.22	77	30.57	61	67.53	88	6859.60	49	305.88	66	10.75	71	7.92	137
	G18	99.45	132	19.84	54	57.84	66	12064.89	20	212.82	46	11.90	75	8.33	71
	M6	414.87	51	47.46	52	60.84	93	9266.48	39	567.02	56	9.44	87	5.55	90
	O6	273.12	82	45.02	63	54.26	71	10332.31	33	338.50	62	12.38	89	8.99	197
	Q3	269.69	72	53.37	55	59.87	62	14436.18	11	496.00	76	6.73	120	4.11	171
Aimakapa Fishpond	J10	94.78	65	23.56	17	43.68	42	9821.56	30	268.80	10	13.33	42	20.15	81
	21	19.05	133	35.99	74	73.06	97	14464.80	12	401.26	47	29.95	53	11.78	49
	25	16.39	109	38.15	62	74.58	106	14396.72	12	397.26	40	29.24	48	11.20	55
	34	31.14	164	40.74	56	71.06	91	14714.74	10	425.60	40	29.59	46	10.32	60
	38	19.47	132	42.24	64	74.05	93	14373.73	12	459.97	40	30.66	56	9.47	48
	39	28.46	149	41.43	62	73.23	89	14346.32	12	474.78	44	30.80	57	11.22	46
	40	44.03	178	46.06	64	79.14	101	13995.87	13	441.93	42	30.36	45	10.45	51
	41	63.41	190	45.60	57	70.52	100	14326.27	9	413.94	34	28.25	45	9.79	70
	45	261.31	152	69.00	54	89.87	80	14964.67	9	560.79	58	18.73	63	7.99	71
	51	142.65	171	54.61	64	64.55	113	14376.67	10	457.56	45	21.06	58	9.34	64
	52	225.82	102	58.02	44	54.77	89	14591.24	9	367.62	50	19.77	55	8.20	41
	59	250.78	130	75.74	58	79.54	67	14551.16	10	559.60	44	22.84	57	6.03	99
	60	265.20	122	71.76	53	63.02	81	14351.92	10	473.63	40	17.23	76	7.50	111
	11	1071.96	21	110.38	12	53.78	61	15205.75	7	1195.64	65	5.64	181	0.18	143
Pools Anchialine	13	1180.47	16	117.37	12	34.35	76	15474.12	6	1369.71	59	5.04	249	0.21	164
	14	1443.44	22	122.03	15	28.46	70	15843.10	5	1460.52	59	2.87	175	0.25	126
	15	1349.53	33	124.24	12	41.34	70	16050.78	7	1358.86	66	5.06	217	0.10	117
	16	1236.13	23	126.10	12	32.35	69	16132.42	6	1357.39	54	4.54	234	0.03	120
	17	1276.22	25	122.87	15	35.09	63	16204.42	5	1468.17	62	5.94	222	0.10	183
	34	1408.87	23	121.54	12	33.23	91	15846.60	6	1354.29	58	5.80	198	0.03	115
	123	1235.73	47	109.41	17	110.78	43	15959.30	7	1728.79	74	6.06	106	10.10	220
	123	1235.73	47	109.41	17	110.78	43	15959.30	7	1728.79	74	6.06	106	10.10	220
Wells (Residential)	W4258-03	934.81	17	138.61	6	12.85	126	23313.20	5	1649.79	67	5.74	156	n.d.	n.d.
	W4158-02	1157.58	28	130.09	8	3.57	113	23490.68	5	2080.52	60	9.76	315	n.d.	n.d.
Wells (Test)	4061-01	1044.44	29	133.53	14	35.67	91	15005.20	6	1375.98	69	3.97	248	n.d.	n.d.
	4161-01	1141.84	32	139.41	8	25.39	86	17651.20	7	1311.07	62	4.01	276	n.d.	n.d.
	4161-02	1487.11	22	152.64	7	19.31	85	17298.05	7	1785.87	52	3.16	217	n.d.	n.d.

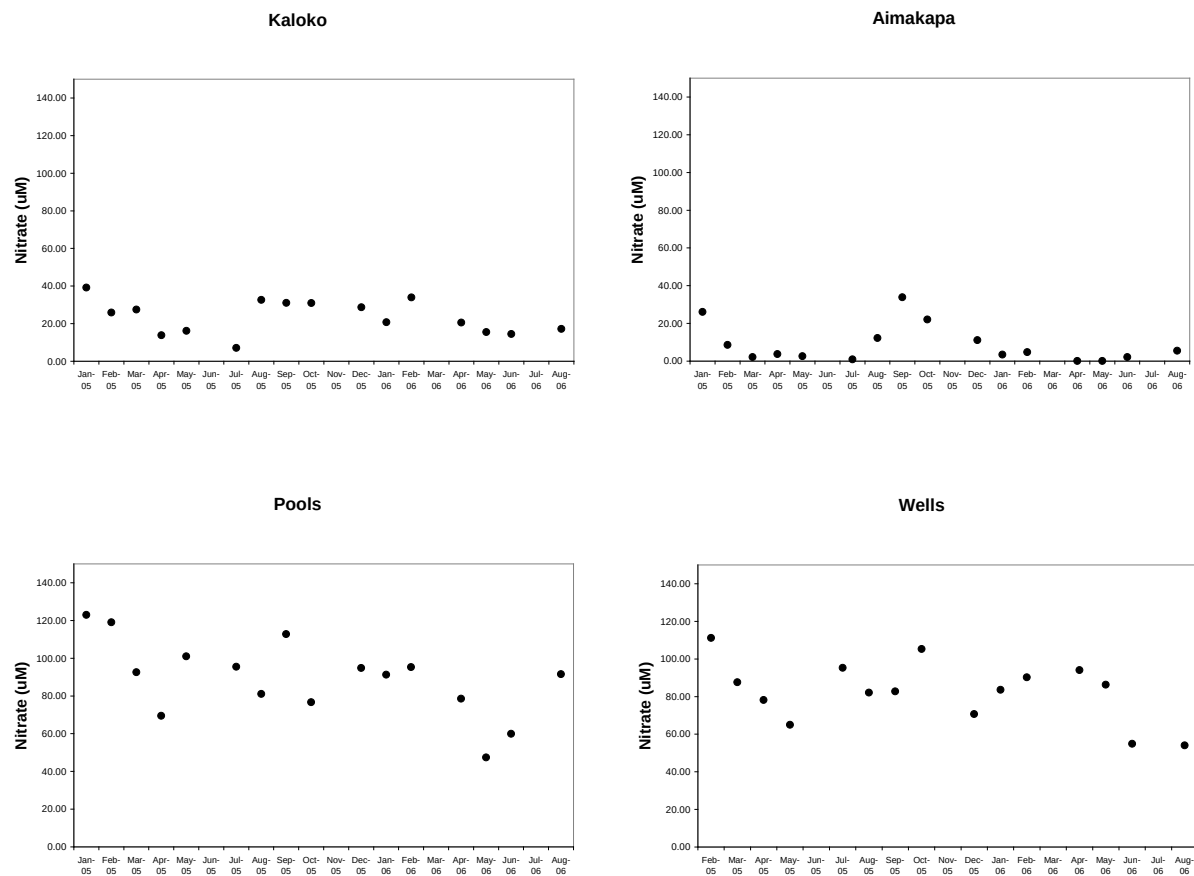


Figure 7. Temporal patterns of average **Nitrate** concentrations over time for each aquatic habitat within the KAHO site.

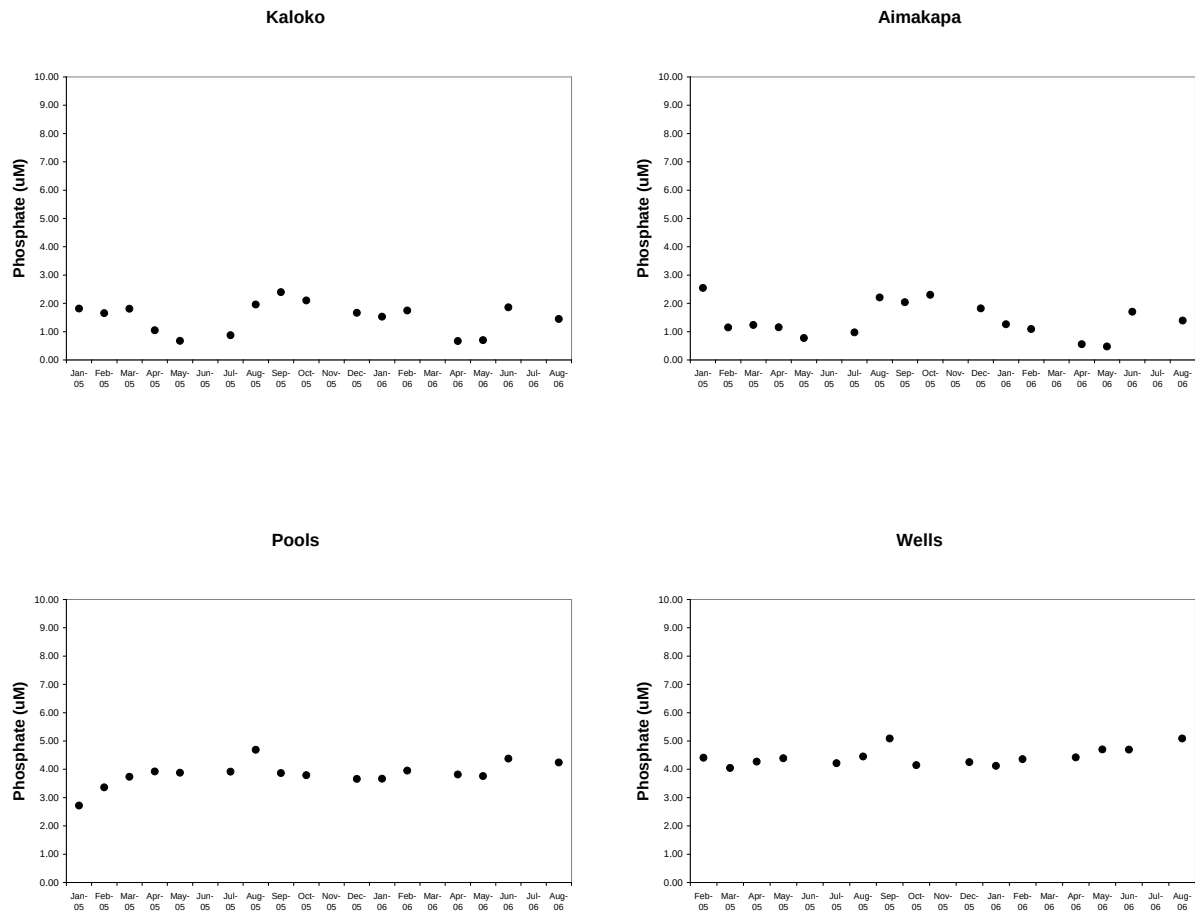


Figure 8. Temporal patterns of average **Phosphate** concentrations over time for each aquatic habitat within the KAHO site.

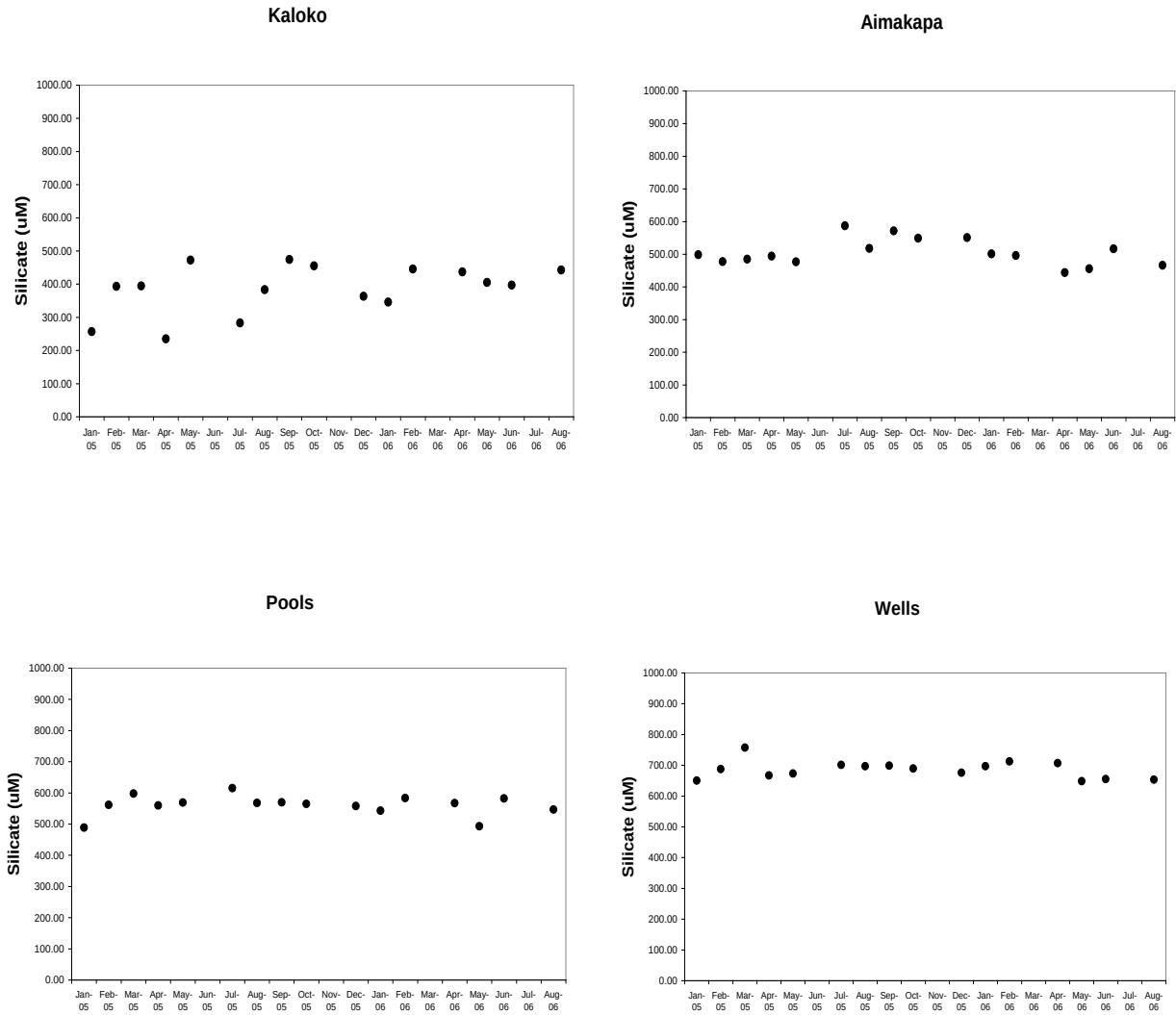


Figure 9. Temporal patterns of average **Silicate** concentrations over time for each aquatic habitat within the KAHO site.

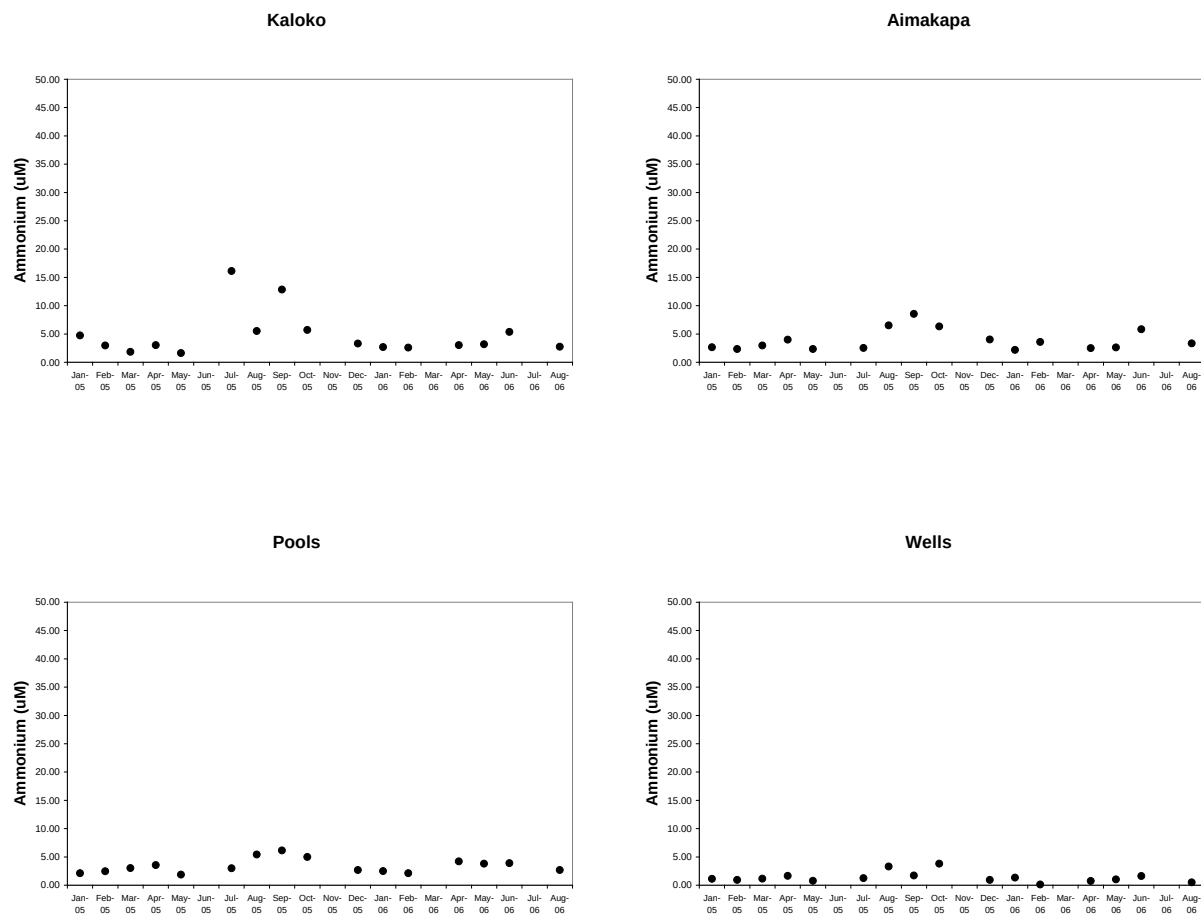


Figure 10. Temporal patterns of average **Ammonium** concentrations over time for each aquatic habitat within the KAHO site.

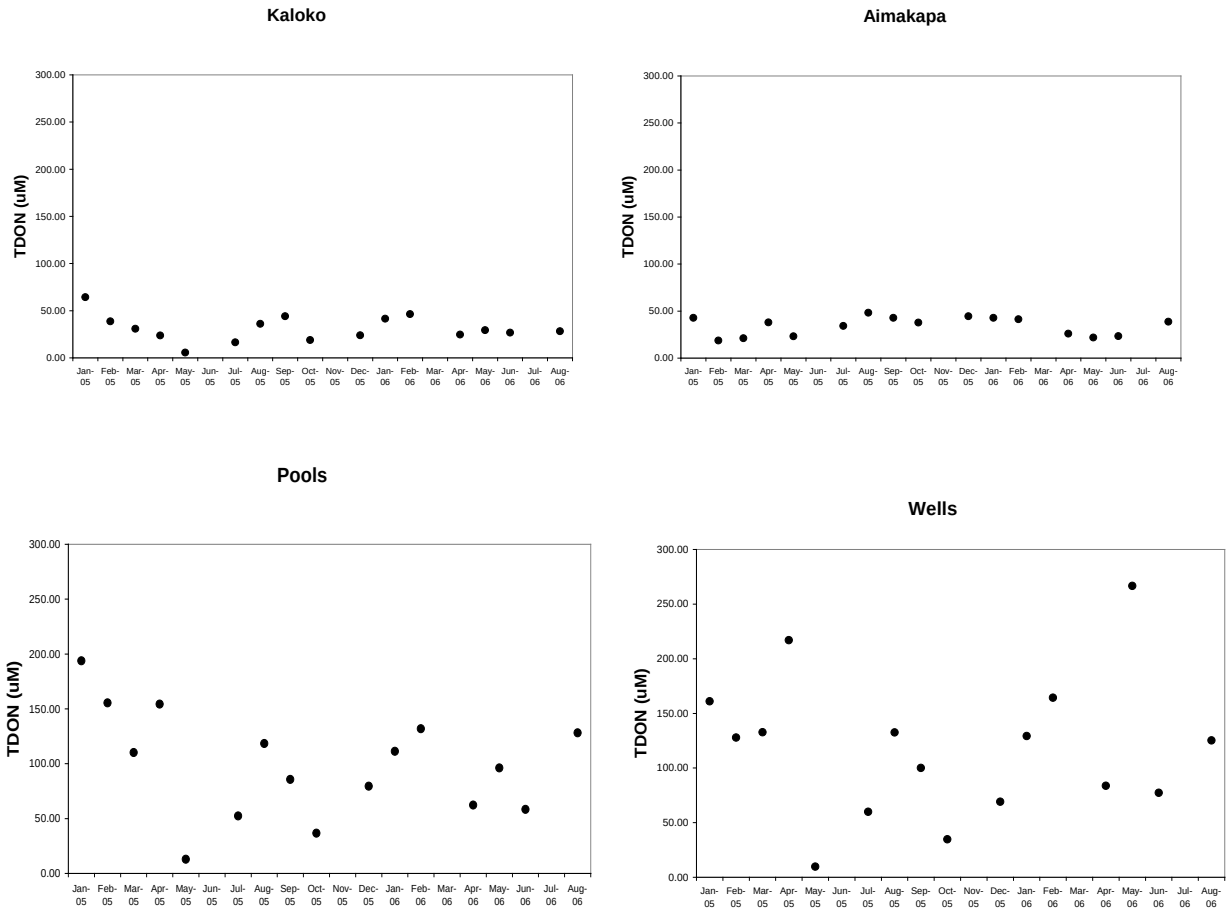


Figure 11. Temporal patterns of average **Dissolved Organic Nitrogen** concentrations over time for each aquatic habitat within the KAHO site.

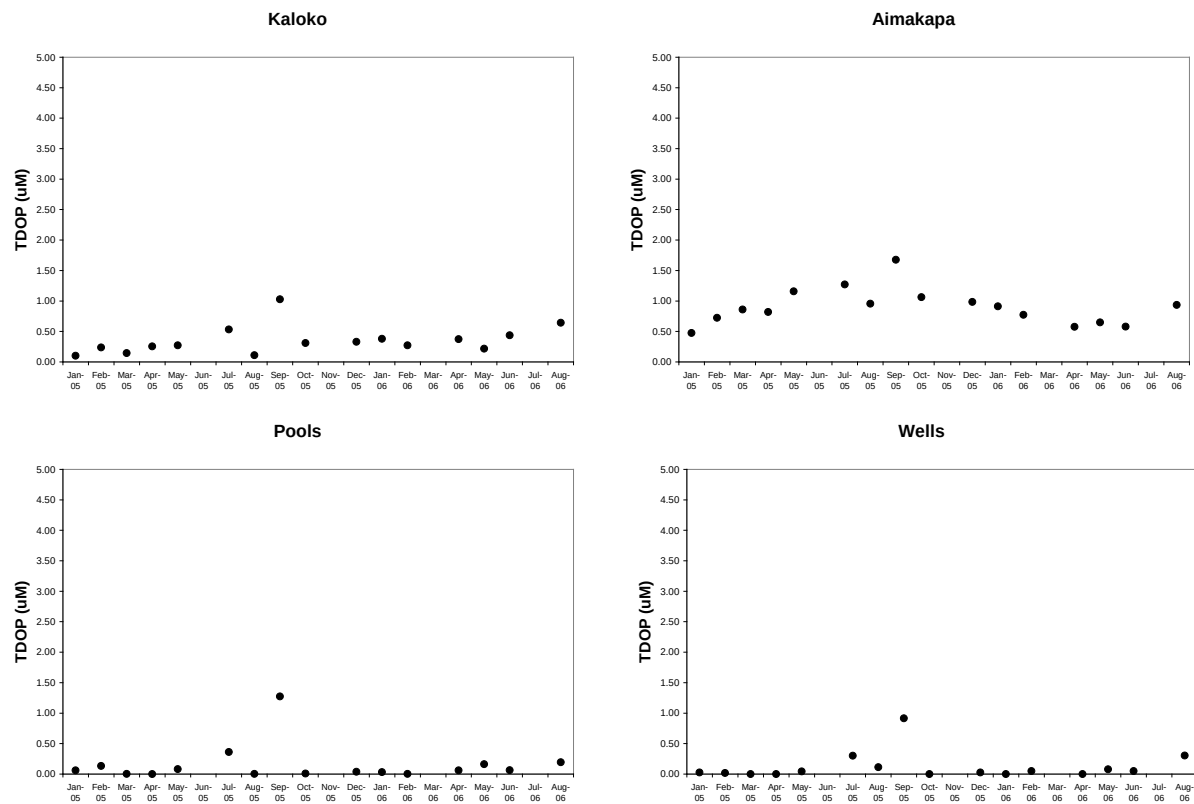


Figure 12. Temporal patterns of average **Dissolved Organic Phosphorous** concentrations over time for each aquatic habitat within the KAHO site.

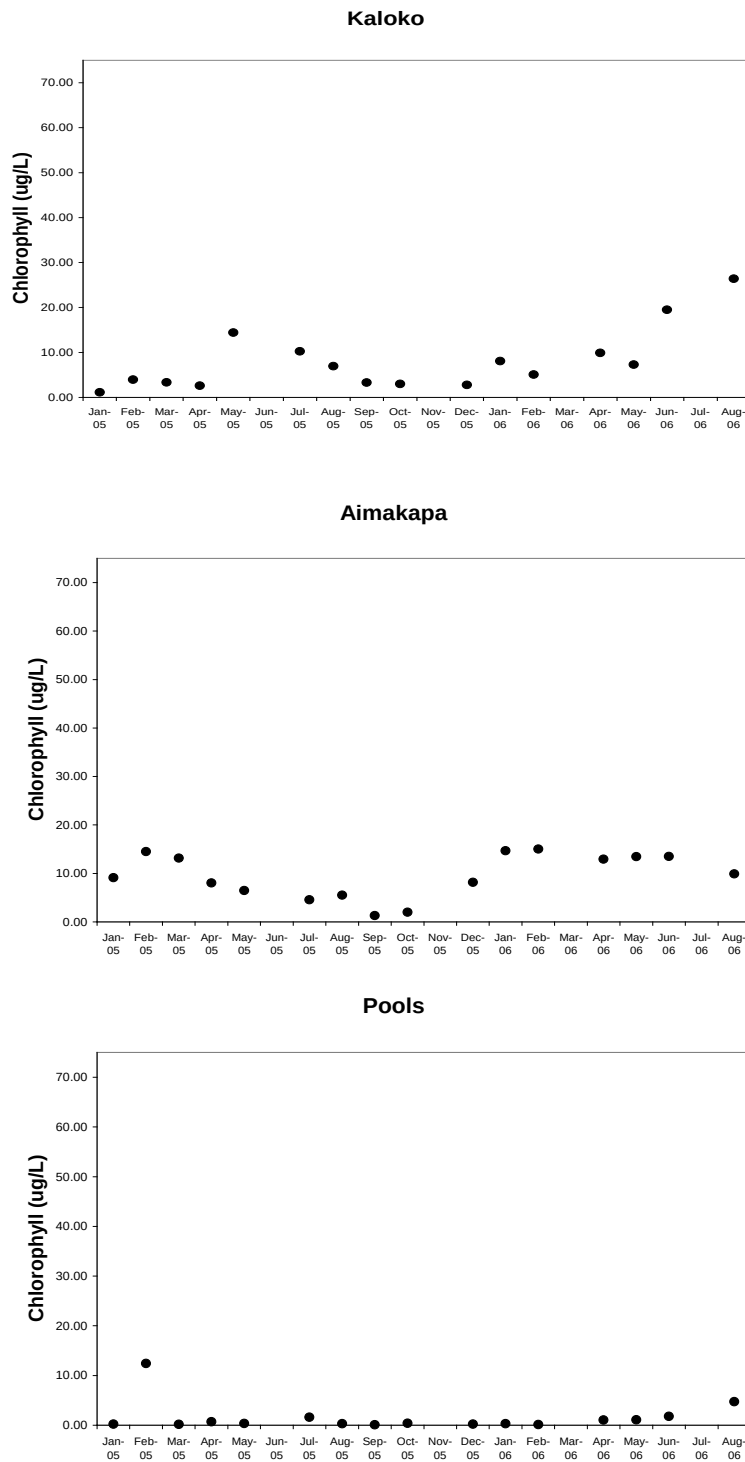


Figure 13. Temporal patterns of average **Chlorophyll a** concentrations over time for each aquatic habitat within the KAHO site.

Table 5 shows the mean values for all hydrological parameters from all sampling locations within each aquatic habitat. The RSD values quantify the degree of spatial variability within each type of water body. Table 6 shows the mean values from each sampling location over time; in this case the RSD values provide measures of the degree of temporal variation at each location. These data are derived from the full dataset contained in Appendix B. These hydrographic results are shown graphically in Figures 14 – 17.

Temperature patterns (Fig. 14) were similar between Kaloko and Aimakapa, showed low spatial variability overall within either environment, and evidence of modest (<1.5 °C) seasonality. Temperatures in the wells and pools showed similar patterns. Temperatures were about 3-5 °C cooler than those in Kaloko and Aimakapa fishponds, showed low (1-3%) variability overall and very modest (<1.0 °C) evidence of seasonality. Generally, salinity values followed the pattern Kaloko > Aimakapa > pools > wells; this directly reflects the degree of mixing with the oceanic waters within these water types (Fig. 15). Despite the fact that the wells are located up-gradient and 300-600m inland from the pools, the salinity of the pools was only 1-2 ppt above that of the wells; reflecting the hydrologic gradient in the area. The highest RSD values for salinity were found in Kaloko; this reflects variations in mixing due to tides, as well as proximity to groundwater input sources. It is interesting that the RSD values observed for salinity in Aimakapa were very similar to RSD values for the pools; such a low degree of variation reflects the very limited mixing with ocean waters in the Aimakapa system.

The pH values (Fig. 16) for the Kaloko and Aimakapa fishponds were similar to nearshore ocean waters (8.0-8.1), slightly greater than average values for the pools (7.97), and values from the mixohaline test wells (7.75). Dissolved oxygen levels in all water bodies were generally at or above 80% saturation (Fig.17), and showed levels typically in the 6.5-7.5 mg/L range (Tables 5 & 6). This pattern of uniformity had two exceptions. Dissolved oxygen in test well 4061-01 averaged about 71% saturation versus ~90% for the other two test wells. There was a more frequent encounter of lowered oxygen levels at various stations in Aimakapa; this may be due to perturbations of the anoxic sediment by the kayak/paddles during sampling. Normally the tidal range in this area is fairly small; tidal heights at the time of sampling are recorded for completeness, and ranged from approximately -0.3 feet to +2.1 feet.

Table 5. Summary of Hydrographic Results for samplings within the January 2005 - August 2006 period. Data reflect the means from all stations within the various water body types.
RSD (%) values give an expression of the degree of variation over time. Source data are given in Appendix B.

			1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/19/2005	7/20/2005	8/24/2005	9/20/2005	10/20/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006
Temperature (°C)	Kaloko	MEAN	24.24	24.69	22.43	26.53	24.44	27.27	25.08	25.47	25.67	23.86	26.16	23.49	25.09	25.38	25.90	24.32
		RSD	7	5	7	4	5	7	14	14	11	9	7	10	6	12	13	9
	Aimakapa	MEAN	22.43	23.24	22.17	25.63	25.33	27.28	27.18	26.91	25.98	23.89	23.15	24.53	26.10	26.31	26.34	28.89
		RSD	2	1	1	2	1	1	3	4	3	4	1	1	2	1	2	3
	Pools	MEAN	19.83	18.30	20.16	20.40	21.08	21.89	21.66	21.05	21.51	20.20	20.23	20.49	17.60	20.75	21.13	22.69
		RSD	3	39	8	2	6	4	7	5	6	2	3	4	54	3	3	10
Salinity (ppt)	Wells	MEAN	20.49	21.38	20.95	22.04	21.90	20.33	21.77	20.65	21.38	20.73	20.15	20.63	26.38	20.33	20.36	20.34
		RSD	4	3	3	4	0	2	4	1	1	4	3	0	2	1	1	2
	Kaloko	MEAN	27.99	24.53	19.25	25.94	17.91	25.97	22.02	23.64	23.48	23.09	25.97	19.68	18.27	20.21	23.80	15.61
		RSD	22	29	31	26	21	27	22	22	20	21	18	28	22	22	30	11
	Aimakapa	MEAN	11.49	12.02	11.77	12.54	11.91	12.55	12.48	12.17	12.37	12.89	13.14	12.89	12.50	12.56	13.45	12.68
		RSD	3	1	2	2	2	1	5	5	6	5	1	2	2	4	2	3
pH	Pools	MEAN	13.95	18.58	14.36	14.48	12.75	12.56	14.57	13.88	13.89	13.70	13.00	13.47	19.20	12.95	14.30	12.16
		RSD	18	11	11	12	11	8	12	14	12	15	14	10	14	19	11	21
	Wells	MEAN	7.39	7.05	7.28	7.32	7.62	7.92	7.89	7.89	8.04	7.98	7.76	7.76	12.65	7.78	8.00	8.21
		RSD	35	38	41	40	42	0	46	45	46	45	44	37	0	38	42	43
	Kaloko	MEAN	8.07	7.76	7.73	8.00	8.27	7.84	8.12	8.07	8.09	7.95	8.17	7.91	8.11	8.01		8.20
		RSD	3	10	3	3	3	3	3	2	4	3	3	3	2	4	n.d	4
DO (%Sat)	Aimakapa	MEAN	7.90	8.40	8.31	7.90	8.49	7.85	8.02	7.84	7.90	7.99	8.27	8.33	8.55	8.13		8.01
		RSD	6	1	3	2	1	6	6	6	5	6	1	2	2	1	n.d	6
	Pools	MEAN	7.84	7.97	8.05	8.01	8.02	7.67	8.09	7.97	7.86	7.87	8.09	7.94	8.08	8.08		7.92
		RSD	3	1	4	1	1	3	3	2	1	1	1	2	2	7	n.d	1
	Wells	MEAN	7.67	7.81	7.69	7.71	7.68	7.48	7.74	7.67	7.65	7.84	7.59	8.19	8.66	8.12		7.59
		RSD	5	10	5	3	5	5	5	6	6	4	5	2	1	8	n.d	4
DO (mg/L)	Kaloko	MEAN	82.15	103.02	92.05	86.72	112.55	100.08	83.18	93.90	116.87	89.92	112.42	90.38	109.97	129.62	92.40	133.55
		RSD	11	14	8	8	8	21	19	22	20	17	22	15	7	40	38	19
	Aimakapa	MEAN	53.55	89.26	88.41	90.95	104.09	84.03	53.18	47.83	61.28	55.73	90.55	72.93	104.59	86.06	58.36	89.19
		RSD	33	6	13	13	6	14	45	40	36	49	9	23	12	11	39	34
	Pools	MEAN	83.16	86.70	100.69	80.49	90.51	91.81	93.91	84.68	98.15	87.03	97.60	88.54	103.53	130.82	108.90	106.30
		RSD	10	7	12	9	8	8	33	6	7	6	14	13	36	17	19	10
Tidal Height (ft)	Wells	MEAN	82.33	78.87	86.13	89.33	87.27	83.83	77.17	81.10	91.23	81.57	91.73	115.57	91.57	95.83	91.30	86.53
		RSD	14	4	11	22	10	18	19	7	16	24	12	24	11	6	9	6
	Kaloko	MEAN	5.75	7.57	7.05	5.97	8.42	6.83	5.99	6.59	8.34	6.62	7.70	6.78	8.16	9.39	6.55	10.11
		RSD	6	17	4	13	8	25	22	21	22	17	20	16	9	39	40	16
	Aimakapa	MEAN	4.28	7.06	7.13	6.86	7.94	6.14	3.89	3.50	4.62	4.34	7.12	5.58	7.87	6.42	4.33	6.33
		RSD	33	6	13	12	6	13	45	39	38	50	9	22	11	11	39	33
Tidal Height (ft)	Pools	MEAN	7.20	7.62	8.52	6.83	7.58	7.57	7.68	7.01	8.10	7.39	8.28	7.45	8.53	11.12	9.22	8.72
		RSD	11	11	31	15	7	8	30	7	7	7	14	13	31	18	20	5
	Wells	MEAN	7.06	6.66	7.31	7.58	7.27	7.21	6.50	6.89	7.69	7.03	7.91	9.85	8.66	8.25	7.90	7.50
		RSD	16	7	12	25	11	20	23	10	18	28	15	26	4	7	9	7
	Kaloko	MEAN	1.62	0.12	0.33	-0.06	0.41	-0.17	1.80	1.89	1.79	2.09	0.33	0.79	0.14	-0.29	0.78	1.56
		RSD	4	16	4	-30	12	0	0	1	1	0	3	2	41	-3	1	0
Tidal Height (ft)	Aimakapa	MEAN	1.39	0.10	0.37	0.05	0.49	-0.15	1.88	1.15	1.64	2.09	0.32	0.79	0.14	-0.27	0.77	1.53
		RSD	9	3	12	85	17	-33	0	6	3	0	2	2	31	-12	2	1
	Pools	MEAN	0.87	0.24	0.42	0.09	0.53	0.29	1.63	1.41	1.34	1.89	0.36	0.66	0.52	-0.15	0.69	1.46
		RSD	20	39	26	67	33	49	6	21	6	4	13	4	16	-98	5	4
	Wells	MEAN	-0.02	1.02	0.19	-0.03	1.26	1.85	1.68	0.57	1.09	1.84	0.55	0.51	0.09	0.55	0.54	1.18
		RSD	-25	0.56	9	-1.5	4	19	3	9	8	10	7	11	5	46	8	6

Table 6. Summary of Temporal Mean Values for all Hydrological parameters over January 2005 – August 2006 survey period. RSD (%) values give an expression of the degree of variation over time. Source data are given in Appendix B.

		Temperature		Salinity		pH		D. O.		D.O.	
		Mean (°C)	RSD	Mean (ppt)	RSD	Mean	RSD	Mean(%Sat)	RSD	Mean(mg/L)	RSD
Kaloko Fishpond	F17	25.37	5	21.22	19	8.17	2	117.9	26	8.48	26
	G6	26.26	7	27.60	14	8.17	2	103.5	22	7.06	22
	G18	25.09	5	21.11	19	8.11	2	114.4	20	8.30	22
	M6	26.22	7	26.58	18	8.10	3	87.9	16	6.04	19
	O6	25.81	8	25.09	25	7.97	6	91.8	19	6.46	23
	Q3	21.44	10	14.23	15	7.58	2	89.0	19	7.32	20
Aimakapa Fishpond	21	25.47	8	12.80	4	8.34	3	90.3	23	6.83	23
	25	25.55	8	12.54	5	8.32	2	89.6	21	6.77	22
	34	25.52	8	12.64	4	8.29	2	88.5	20	6.70	21
	38	25.49	8	12.64	5	8.14	3	77.5	39	5.85	39
	39	25.38	8	12.71	4	8.29	3	85.7	23	6.48	23
	40	25.25	8	12.69	4	8.22	3	81.0	27	6.17	28
	41	25.29	8	12.65	4	8.20	3	79.1	27	6.02	28
	45	25.08	9	11.93	7	7.85	7	76.0	36	6.09	38
	51	25.91	10	12.62	5	8.14	4	74.5	38	5.91	41
	52	25.79	8	12.30	4	8.06	3	73.5	28	5.88	34
	59	24.82	6	12.23	5	7.83	6	58.1	55	4.70	49
	60	25.77	8	12.40	5	7.89	5	58.9	54	4.77	57
Pools Anchialine	11	21.44	8	11.18	14	7.96	2	100.2	21	8.35	20
	13	20.78	3	11.31	11	7.89	1	88.0	19	7.58	23
	14	21.03	6	10.15	10	7.95	1	90.3	9	7.66	11
	15	20.76	5	9.27	9	7.96	1	92.9	15	7.95	14
	16	20.06	3	9.39	7	7.98	2	93.6	12	8.05	12
	17	20.36	4	8.98	24	8.03	1	97.5	11	8.29	10
	34	19.00	25	9.98	8	7.95	1	90.8	13	7.93	16
	123	22.66	7	8.09	6	8.07	6	103.2	40	8.37	38
Wells (Test)	4061-01	21.19	3	11.34	6	8.04	4	75.5	12	6.25	14
	4161-01	21.19	8	7.07	22	7.36	5	92.6	8	7.93	9
	4161-02	21.02	8	5.66	34	7.91	2	97.2	16	8.41	15

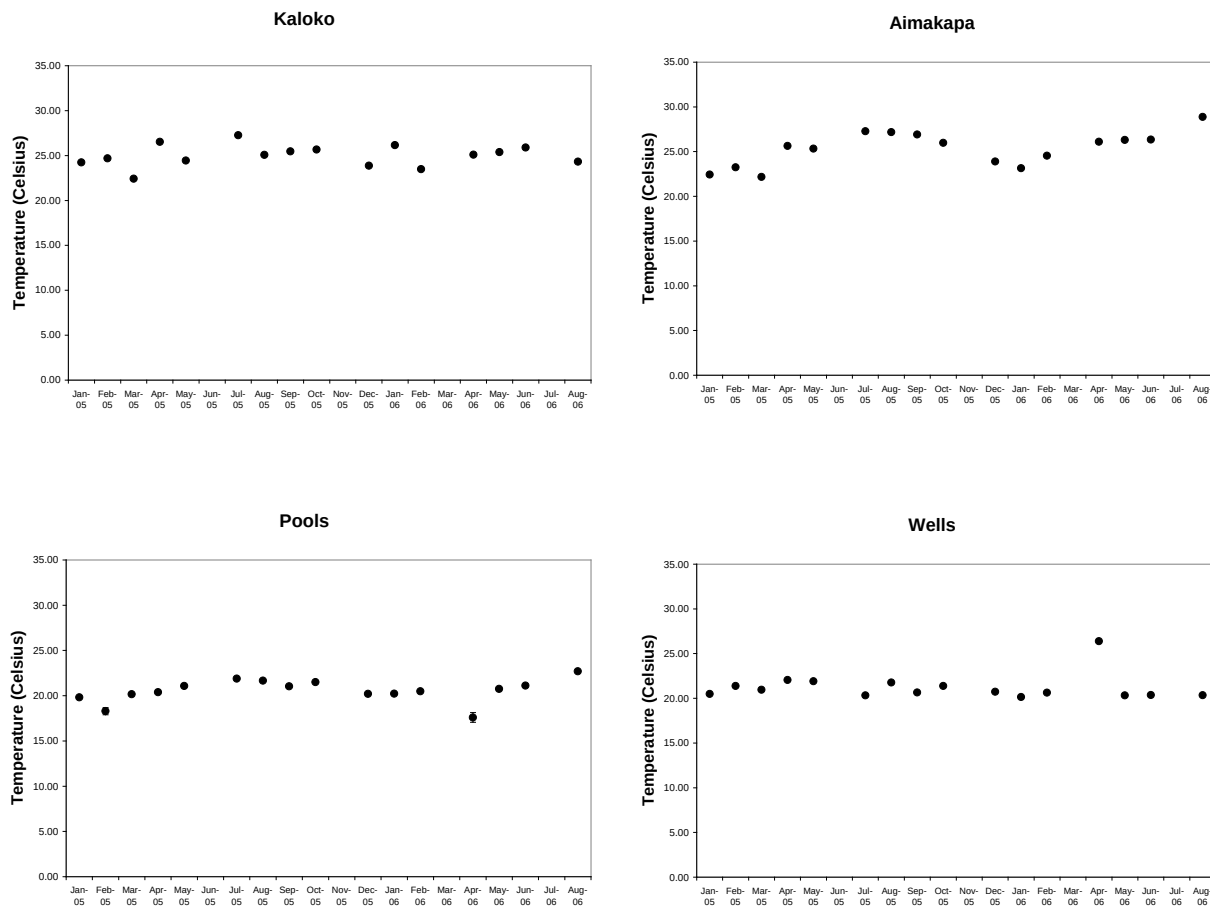


Figure 14. Temporal patterns of **Temperature** over time for each aquatic habitat within the KAHO site.

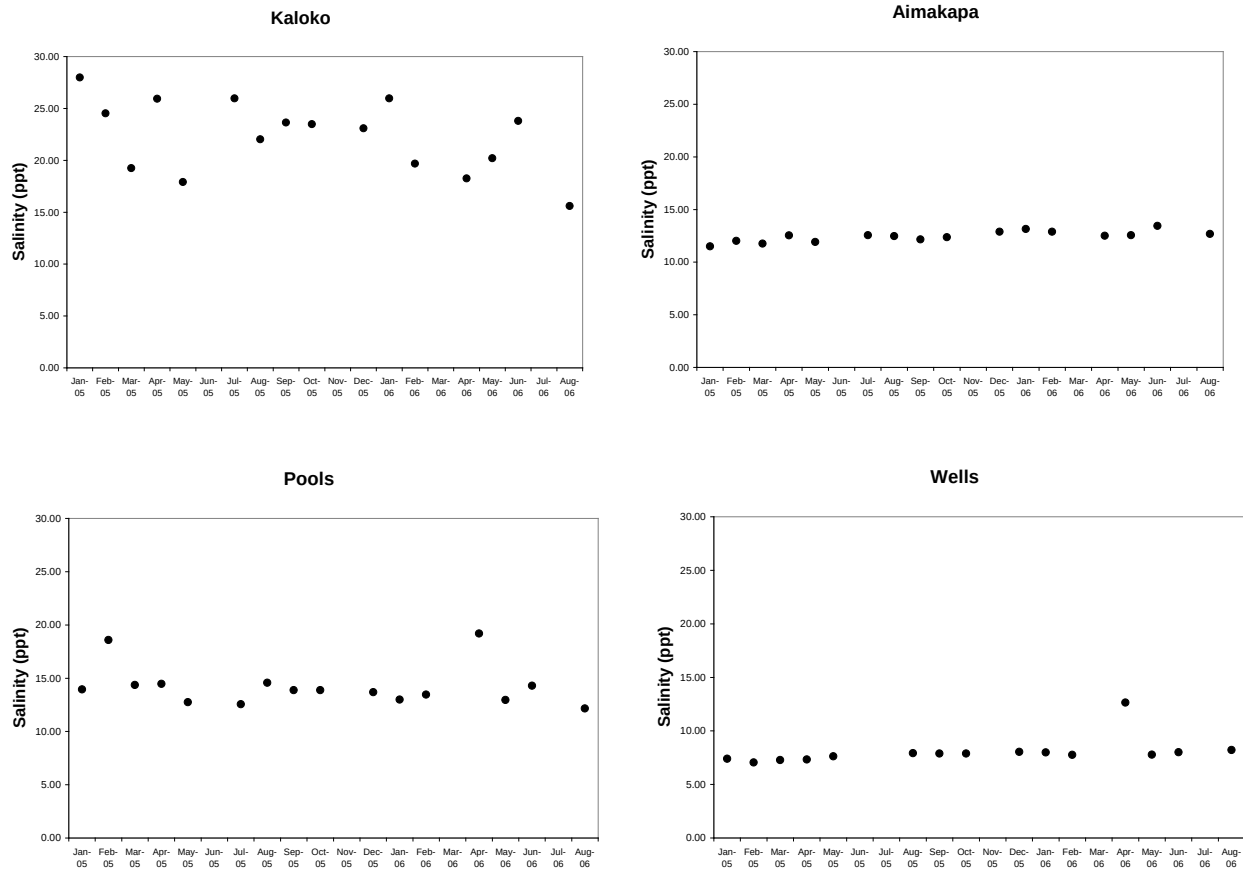


Figure 15. Temporal patterns of **Salinity** over time for each aquatic habitat within the KAHŌ site.

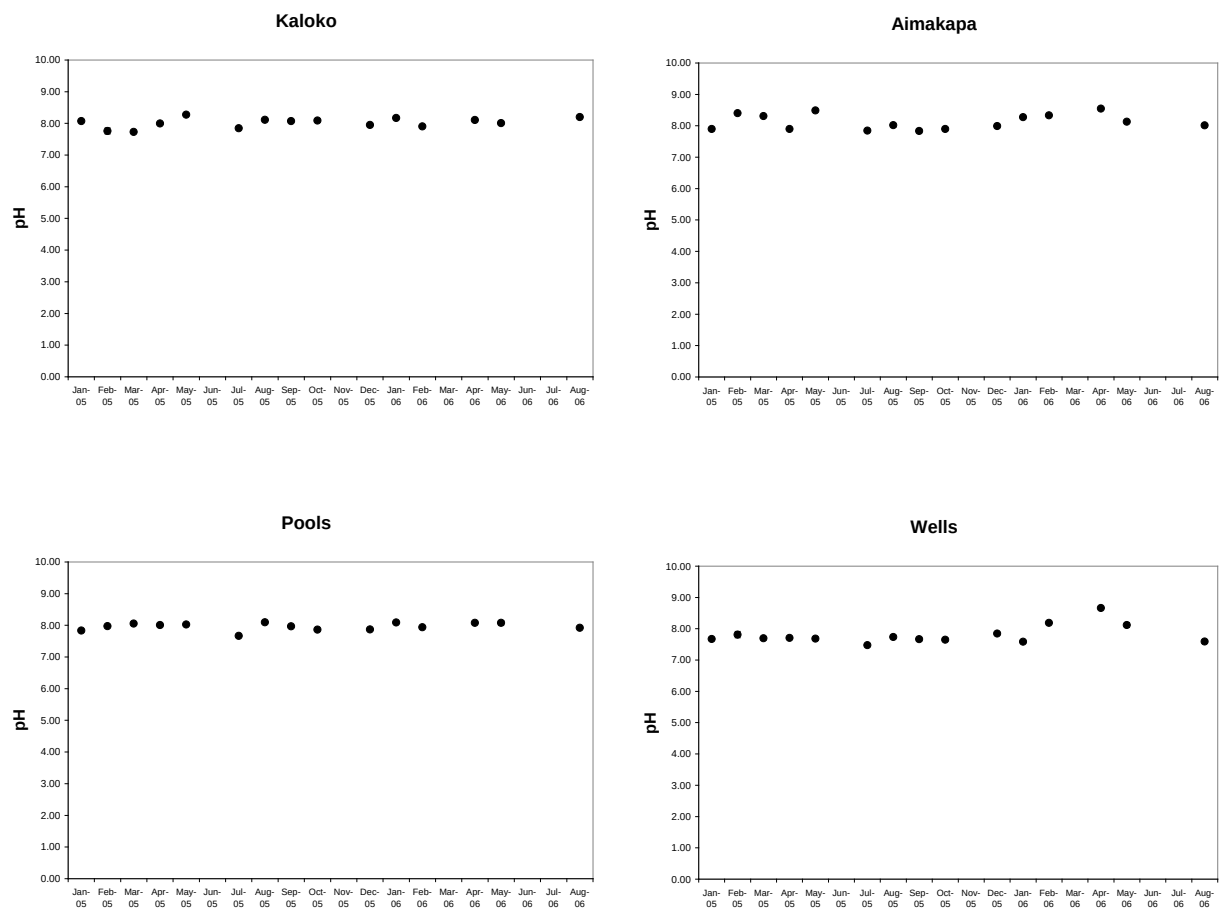


Figure 16. Temporal patterns of **pH** over time for each aquatic habitat within the KAHO site.

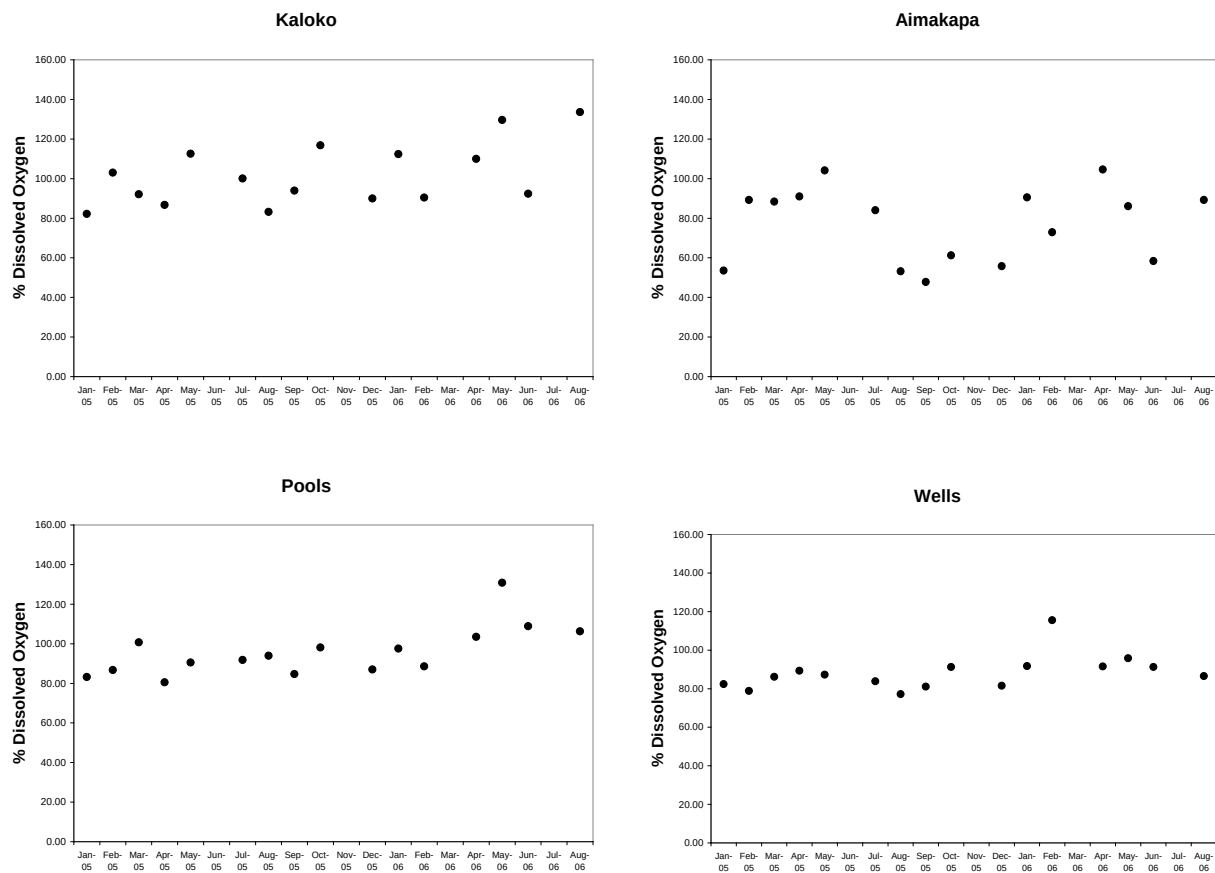


Figure 17. Temporal patterns of **Dissolved Oxygen (% saturation)** over time for each aquatic habitat within the KAHO site.

The water quality and hydrographic findings are further summarized by various statistical approaches to present several ways of viewing the characteristic condition described by this sampling of each of these aquatic environments (Tables 7, 8, 10, 11,12,). Tables 7 and 8 show the minimum, maximum, mean and index of variation (i.e. RSD) for each of the various water quality and hydrographic parameters. These provide an expedient view of the synoptic conditions, as described by this project. Tables 10, 11,12 give the median values as well as the 95% confidence limits for the upper and lower bounds for 'normal' condition as described by this project. These values were derived by first examining the sixteen samplings in the January 2005 to August 2006 period for evidence of seasonality using a runs test (Laws, 1997). Finding no evidence of significant ($p>0.05$) seasonality, the data were subjected to the nonparametric protocol described in Tate and Clelland (1957) using Matlab software. These 95% threshold values for the upper and lower bounds of values described during this sampling effort give the values which need to be exceeded by sampling of similar scope for significant ($p<0.05$) difference to be demonstrated.

Table 7. Summary of synoptic descriptors of water quality (uM) in the January 2005 – August 2006 period for various aquatic habitats within the Kaloko-Honokohau National Historical Park.

	Temp.	Salinity	tide	pH	D. O.	D. O.	NO3	PO4	NH4	Si04	TDON	TDOP	Chl a
	(°C)	(ppt)	(ft)	(units)	(mg/L)	(% Sat.)	(uM)	(uM)	(uM)	(uM)	(uM)	(uM)	(ug/L)
Kaloko													
Mean	25.03	22.64	0.8	8.02	7.27	100.9	24.35	1.54	4.86	374.20	31.33	0.40	6.37
Minimum	18.92	10.50	-0.3	6.38	3.11	46.8	0.10	0.14	0.13	54.42	0.5	0	0.09
Maximum	29.19	33.78	2.1	8.48	14.35	200.0	168.40	4.21	57.3	611.6	194.98	1.48	48.42
RSD	10	27	94	4	25	24	101	68	125	35	82	84	110
Aimakapa													
Mean	25.34	12.50	0.7	8.13	5.94	77.8	8.13	1.66	5.16	512.20	31.61	0.88	9.66
Minimum	21.49	10.63	-0.3	7.14	0.25	3.2	0.10	0.26	0.74	289	1.19	0	0.24
Maximum	29.74	13.84	2.1	8.74	9.86	130	90.30	4.49	24.68	639.6	147.2	2.33	33.95
RSD	7	5	96	4	33	34	198	64	91	11	51	59	62
Anchialine Pools													
Mean	20.74	9.82	0.8	7.97	8.01	94.3	91.29	3.86	3.26	562.78	100.46	0.22	1.63
Minimum	18.69	4.80	-0.3	7.18	4.63	54.2	35.60	2.31	0.13	130.7	2.65	0	0.00
Maximum	27.14	15.68	2.0	9.11	14.87	186.6	183.00	5.28	14.17	635.8	397.74	1.8	95.33
RSD	11	16	73	3	20	21	28	14	85	9	64	172	569
Wells													
Mean	21.13	7.95	0.8	7.76	7.56	88.2	81.41	4.48	1.39	681.35	116.80	0.20	NaN
Minimum	19.78	4.87	-0.1	7.06	4.79	58.5	41.10	3.63	0.13	380.2	1.97	0	NaN
Maximum	26.66	12.65	2.2	8.77	12.62	146.5	160.60	5.55	8.57	961	330.27	1.39	NaN
RSD	6	36	77	5	18	16	30	10	117	20	67	178	NaN

Table 8. Summary of synoptic descriptors of water quality (ug/L) in the January 2005 – August 2006 period for various aquatic habitats within the Kaloko-Honokohau National Historical Park.

	Temp. (°C)	Salinity (ppt)	tide (ft)	pH (units)	D. O. (mg/L)	D. O. (% Sat.)	NO3 (ug/L)	PO4 (ug/L)	NH4 (ug/L)	SiO4 (ug/L)	TDON (ug/L)	TDOP (ug/L)	Chl a (ug/L)	
Kaloko														
Mean	25.03	22.64		0.8	8.02	7.27	100.9	340.86	47.88	68.09	10477.64	438.62	12.43	6.37
Minimum	18.92	10.50		-0.3	6.38	3.11	46.8	1.40	4.34	1.82	1523.76	7.00	0.00	0.09
Maximum	29.19	33.78		2.1	8.48	14.35	200.0	2357.60	130.51	802.20	17124.80	2729.72	46.03	48.42
RSD	10	27		94	4	25	24	101	68	125	35	82	84	110
Aimakapa														
Mean	25.34	12.50		0.7	8.13	5.94	77.8	113.80	51.44	72.29	14341.73	442.54	27.36	9.66
Minimum	21.49	10.63		-0.3	7.14	0.25	3.2	1.40	8.06	10.36	8092.00	16.66	0.00	0.24
Maximum	29.74	13.84		2.1	8.74	9.86	130	1264.20	139.19	345.52	17908.80	2060.80	72.23	33.95
RSD	7	5		96	4	33	34	198	64	91	11	51	59	62
Anchialine Pools														
Mean	20.74	9.82		0.8	7.97	8.01	94.3	1278.11	119.55	45.58	15757.78	1406.41	6.86	1.63
Minimum	18.69	4.80		-0.3	7.18	4.63	54.2	498.40	71.61	1.82	3659.60	37.10	0.00	0.00
Maximum	27.14	15.68		2.0	9.11	14.87	186.6	2562.00	163.68	198.38	17802.40	5568.36	55.80	95.33
RSD	11	16		73	3	20	21	28	14	85	9	64	172	569
Wells														
Mean	21.13	7.95		0.8	7.76	7.56	88.2	1139.75	138.91	19.47	19077.90	1635.19	6.09	n.d.
Minimum	19.78	4.87		-0.1	7.06	4.79	58.5	575.40	112.53	1.82	10645.60	27.58	0.00	n.d.
Maximum	26.66	12.65		2.2	8.77	12.62	146.5	2248.40	172.05	119.98	26908.00	4623.78	43.09	n.d.
RSD	6	36		77	5	18	16	30	10	117	20	67	178	n.d.

Table 9. Summary of **QC Data** for all samplings and analytes within the January 2005-August 2006 Period
 Results give the RSD (100 x SD/MEAN) of triplicate analyses from 15 separate samplings
 from two locations within Aimakapa Fishpond and one location within Kaloko Fishpond
 Source Data are given in Appendix C.

	NH4	NO3	SiO2	PO4	TDN	TDP	Chl a
Minimum	0	0	0	0	1	0	0
Maximum	58	22	23	19	20	19	31
Mean	12	6	2	4	7	4	10

Table 10. Summary of Statistical Analyses of Water Quality results for all stations and parameters, and sampling occasions during the January 2005 to August 2006 period. Results (ug/L) give the median values from 16 samplings and the 95% confidence values for the upper and lower bounds for the data.

		NO3			PO4			NH4			SiO2			DON			DOP		
		Median	Lower	Upper	Median	Lower	Upper	Median	Lower	Upper	Median	Lower	Upper	Median	Lower	Upper	Median	Lower	Upper
Kaloko	F17	230.16	79.94	330.54	25.11	13.95	38.13	46.76	31.5	65.38	11026.4	9122.4	13350.4	242.9	191.38	402.5	11.16	9.92	16.12
	G6	77.42	16.1	156.24	18.6	13.64	22.63	33.6	21	79.66	8425.2	5684	10175.2	219.66	156.38	279.3	8.68	7.13	13.33
	G18	412.86	330.68	556.08	47.74	31.31	61.38	47.18	37.8	60.9	12322.8	11659.2	13658.4	564.06	333.62	700	9.3	6.82	17.98
	M6	332.92	100.38	460.32	37.2	24.18	61.38	43.12	29.4	57.4	10152.8	9402.4	11866.4	258.02	183.4	400.82	9.61	5.27	13.02
	O6	209.3	128.1	399.84	59.21	25.73	76.57	43.82	31.64	63.14	10155.6	8276.8	12891.2	309.96	186.2	612.36	9.61	7.44	13.64
	Q3	589.82	546	724.5	96.1	86.18	102.3	53.76	38.64	76.16	14448	13529.6	15041.6	767.06	607.32	833.42	4.65	3.1	8.06
Aimakapa	21	1.4	1.4	21.56	25.42	15.5	32.55	34.44	29.12	53.34	13776	12885.6	15478.4	394.66	282.52	517.02	26.35	22.94	43.09
	25	11.34	1.4	33.04	28.21	22.63	39.06	39.34	33.88	55.72	13935.6	12964	15299.2	378.7	324.8	550.06	28.83	22.94	38.44
	34	18.76	1.4	36.96	33.17	25.42	36.89	43.26	33.04	49.14	14249.2	13652.8	15618.4	446.46	327.74	608.86	30.69	22.01	38.13
	38	6.58	1.4	16.38	27.9	24.49	40.92	40.74	36.54	70.98	13756.4	12919.2	15148	462.14	355.18	640.64	31	22.63	39.68
	39	5.04	1.4	19.18	30.07	21.39	39.68	40.74	33.32	72.94	13865.6	13356	14980	449.96	358.12	670.46	29.14	25.11	40.3
	40	13.58	1.4	36.12	31.62	25.73	46.5	35.42	31.5	56.42	13591.2	12689.6	14856.8	370.86	340.2	487.9	31	27.9	37.2
	41	15.68	1.4	71.54	34.72	27.59	48.98	44.94	32.9	51.94	13781.6	13361.6	14420	390.88	341.46	534.8	29.45	25.73	34.41
	45	66.08	1.4	276.36	53.94	37.82	98.58	53.06	42	106.82	14800.8	13882.4	15640.8	571.62	329.84	814.66	19.53	15.81	30.38
	51	28.98	1.4	120.26	35.03	28.21	43.71	41.86	25.48	56.98	14005.6	13412	14968.8	504.98	333.34	568.82	24.49	17.05	29.14
	52	221.2	85.96	298.48	54.25	36.27	62.93	34.58	26.32	41.16	14145.6	13848.8	14991.2	512.26	150.36	518.28	18.91	14.57	24.18
	59	54.46	1.4	543.9	39.68	34.72	112.53	53.76	44.24	86.1	13865.6	13456.8	15310.4	504.98	445.2	764.12	24.49	9.61	33.17
	60	121.1	1.4	395.5	47.43	34.72	100.44	43.4	33.18	54.32	13770.4	13540.8	14532	487.2	360.36	558.6	21.7	6.82	23.25
Pools	11	1085.7	985.6	1146.6	119.04	104.78	113.15	42.42	35.56	61.74	15335.6	14694.4	15864.8	1206.52	521.92	1679.02	4.34	1.24	8.99
	13	1241.1	1065.4	1311.8	115.32	111.6	120.28	35	14.28	44.1	15372	14896	15965.6	1178.8	688.24	1684.9	5.89	0.31	50.53
	14	1419.6	1185.8	1547	118.11	115.01	123.07	29.12	11.48	43.4	15836.8	15321.6	16066.4	1442.56	743.4	1763.58	3.72	0.31	14.57
	15	1285.62	1082.2	1352.4	124.93	120.9	128.03	38.78	30.52	59.92	16175.6	15691.2	16374.4	1039.08	724.36	1511.44	4.03	1.86	45.26
	16	1240.4	1108.8	1388.8	125.55	120.9	127.72	26.46	22.4	47.18	16066.4	15926.4	16234.4	1245.58	923.02	1753.22	5.27	0.93	46.19
	17	1262.8	981.4	1502.2	124.31	118.42	127.41	30.1	25.2	35.28	16144.8	15674.4	16436	1214.5	789.88	1995.7	3.41	0.31	55.8
	34	1449	1192.8	1527.4	121.21	115.94	125.24	31.08	12.04	40.46	15898.4	15685.6	16133.6	1160.6	867.72	1628.62	3.72	0.62	45.57
	123	1239	631.4	1439.2	110.05	97.65	115.01	101.36	89.04	135.66	16007.6	15573.6	16346.4	1546.44	865.48	2121.7	5.27	1.86	14.88
Wells	W4258-03	70.58	56.65	75.3	4.37	4.32	4.59	0.2	0.13	1.7	829.9	808.8	854	128.02	56.27	145.17	0.02	0.01	0.29
	W4158-02	81.65	67	90.48	4.11	4.03	4.22	0.13	0.13	0.13	826.4	812.8	841.8	128.6	87.87	170.67	0.01	0.01	0.09
	4061-01	75.7	53.2	86.3	4.12	3.82	4.93	1.68	1.34	2.43	541.8	514	555.2	91.08	69.81	113.1	0.03	0.01	0.15
	4161-01	78.6	62.7	88.9	4.45	4.23	4.58	1.65	0.88	2.38	640.2	590.6	655.8	104.64	47.67	126.45	0.01	0.01	0.01
	4161-02	109.85	96.4	115.3	4.81	4.69	5.16	1.07	0.65	1.66	622	595.2	638.4	112.94	96.7	162.12	0.01	0.01	0.01

Table 11. Summary of Statistical Analyses of Water Quality results for all stations and parameters, and sampling occasions during the January 2005 to August 2006 period. Results (uM) give the median values from 16 samplings and the 95% confidence values for the upper and lower bounds for the data.

		NO3			PO4			NH4			SiO2			DON			DOP			Chl (ug/L)		
		Median	Lower	Upper	Median	Lower	Upper	Median	Lower	Upper	Median	Lower	Upper	Median	Lower	Upper	Median	Lower	Upper	Median	Lower	Upper
Kaloko	F17	16.44	5.71	23.61	0.81	0.45	1.23	3.34	2.25	4.67	393.80	325.80	476.80	17.35	13.67	28.75	0.36	0.32	0.52	7.95	4.02	10.63
	G6	5.53	1.15	11.16	0.60	0.44	0.73	2.40	1.50	5.69	300.90	203.00	363.40	15.69	11.17	19.95	0.28	0.23	0.43	5.73	2.54	9.01
	G18	29.49	23.62	39.72	1.54	1.01	1.98	3.37	2.70	4.35	440.10	416.40	487.80	40.29	23.83	50.00	0.30	0.22	0.58	3.93	2.01	7.26
	M6	23.78	7.17	32.88	1.20	0.78	1.98	3.08	2.10	4.10	362.60	335.80	423.80	18.43	13.10	28.63	0.31	0.17	0.42	5.56	2.43	10.63
	O6	14.95	9.15	28.56	1.91	0.83	2.47	3.13	2.26	4.51	362.70	295.60	460.40	22.14	13.30	43.74	0.31	0.24	0.44	4.21	1.87	7.26
	Q3	42.13	39.00	51.75	3.10	2.78	3.30	3.84	2.76	5.44	516.00	483.20	537.20	54.79	43.38	59.53	0.15	0.10	0.26	1.39	0.18	3.15
Aimakapa	21	0.10	0.10	1.54	0.82	0.50	1.05	2.46	2.08	3.81	492.00	460.20	552.80	28.19	20.18	36.93	0.85	0.74	1.39	12.16	8.09	14.59
	25	0.81	0.10	2.36	0.91	0.73	1.26	2.81	2.42	3.98	497.70	463.00	546.40	27.05	23.20	39.29	0.93	0.74	1.24	11.57	10.17	13.40
	34	1.34	0.10	2.64	1.07	0.82	1.19	3.09	2.36	3.51	508.90	487.60	557.80	31.89	23.41	43.49	0.99	0.71	1.23	11.79	6.70	14.00
	38	0.47	0.10	1.17	0.90	0.79	1.32	2.91	2.61	5.07	491.30	461.40	541.00	33.01	25.37	45.76	1.00	0.73	1.28	11.45	5.27	12.29
	39	0.36	0.10	1.37	0.97	0.69	1.28	2.91	2.38	5.21	495.20	477.00	535.00	32.14	25.58	47.89	0.94	0.81	1.30	11.09	7.16	14.00
	40	0.97	0.10	2.58	1.02	0.83	1.50	2.53	2.25	4.03	485.40	453.20	530.60	26.49	24.30	34.85	1.00	0.90	1.20	10.47	6.47	13.87
	41	1.12	0.10	5.11	1.12	0.89	1.58	3.21	2.35	3.71	492.20	477.20	515.00	27.92	24.39	38.20	0.95	0.83	1.11	8.89	5.20	11.09
	45	4.72	0.10	19.74	1.74	1.22	3.18	3.79	3.00	7.63	528.60	495.80	558.60	40.83	23.56	58.19	0.63	0.51	0.98	8.28	3.12	12.83
	51	2.07	0.10	8.59	1.13	0.91	1.41	2.99	1.82	4.07	500.20	479.00	534.60	36.07	23.81	40.63	0.79	0.55	0.94	9.83	6.01	12.66
	52	15.80	6.14	21.32	1.75	1.17	2.03	2.47	1.88	2.94	505.20	494.60	535.40	36.59	10.74	37.02	0.61	0.47	0.78	8.51	4.84	10.13
	59	3.89	0.10	38.85	1.28	1.12	3.63	3.84	3.16	6.15	495.20	480.60	546.80	36.07	31.80	54.58	0.79	0.31	1.07	3.91	1.20	10.40
	60	8.65	0.10	28.25	1.53	1.12	3.24	3.10	2.37	3.88	491.80	483.60	519.00	34.80	25.74	39.90	0.70	0.22	0.75	5.31	0.48	12.59
Pools	11	77.550	70.400	81.900	3.840	3.380	3.650	3.03	2.54	4.41	547.70	524.80	566.60	86.18	37.28	119.93	0.14	0.04	0.29	0.09	0.05	0.22
	13	88.650	76.100	93.700	3.720	3.600	3.880	2.50	1.02	3.15	549.00	532.00	570.20	84.20	49.16	120.35	0.19	0.01	1.63	0.04	0.01	0.82
	14	101.400	84.700	110.500	3.810	3.710	3.970	2.08	0.82	3.10	565.60	547.20	573.80	103.04	53.10	125.97	0.12	0.01	0.47	0.07	0.04	0.67
	15	91.830	77.300	96.600	4.030	3.900	4.130	2.77	2.18	4.28	577.70	560.40	584.80	74.22	51.74	107.96	0.13	0.06	1.46	0.07	0.05	0.11
	16	88.600	79.200	99.200	4.050	3.900	4.120	1.89	1.60	3.37	573.80	568.80	579.80	88.97	65.93	125.23	0.17	0.03	1.49	0.02	0.01	0.04
	17	90.200	70.100	107.300	4.010	3.820	4.110	2.15	1.80	2.52	576.60	559.80	587.00	86.75	56.42	142.55	0.11	0.01	1.80	0.04	0.01	0.16
	34	103.500	85.200	109.100	3.910	3.740	4.040	2.22	0.86	2.89	567.80	560.20	576.20	82.90	61.98	116.33	0.12	0.02	1.47	0.02	0.01	0.03
	123	88.50	45.10	102.80	3.55	3.15	3.71	7.24	6.36	9.69	571.70	556.20	583.80	110.46	61.82	151.55	0.17	0.06	0.48	2.16	1.12	5.43
Wells	W4258-03	70.58	56.65	75.30	4.37	4.32	4.59	0.20	0.13	1.70	829.90	808.80	854.00	128.02	56.27	145.17	0.02	0.01	0.29			
	W4158-02	81.65	67.00	90.48	4.11	4.03	4.22	0.13	0.13	0.13	826.40	812.80	841.80	128.60	87.87	170.67	0.01	0.01	0.09			
	4061-01	75.70	53.20	86.30	4.12	3.82	4.93	1.68	1.34	2.43	541.80	514.00	555.20	91.08	69.81	113.10	0.03	0.01	0.15			
	4161-01	78.60	62.70	88.90	4.45	4.23	4.58	1.65	0.88	2.38	640.20	590.60	655.80	104.64	47.67	126.45	0.01	0.01	0.01			
	4161-02	109.85	96.40	115.30	4.81	4.69	5.16	1.07	0.65	1.66	622.00	595.20	638.40	112.94	96.70	162.12	0.01	0.01	0.01			

Table 12. Summary of Statistical Analyses of Hydrological results for all stations, parameters and sampling occasions during the January 2005 to August 2006 period. Results give the median values from 16 samplings and the 95% confidence values for the upper and lower bounds for the data.

		Temperature (°C)			Salinity (ppt)			pH (units)			Dissolved Oxygen (mg/L)		
		Median	Lower	Upper	Median	Lower	Upper	Median	Lower	Upper	Median	Lower	Upper
Kaloko	F17	25.28	24.48	26.45	21.74	17.85	22.32	8.16	8.07	8.35	8.51	7.47	9.10
	G6	26.34	25.43	27.52	26.65	25.90	30.17	8.14	8.08	8.27	7.10	5.82	7.76
	G18	25.10	24.36	26.05	21.08	17.63	22.48	8.16	7.96	8.19	8.21	7.75	8.77
	M6	25.70	25.38	27.28	27.29	22.24	29.30	8.13	7.94	8.22	5.81	5.57	6.82
	O6	25.40	24.61	26.94	27.48	21.84	28.79	8.16	8.05	8.20	6.20	5.97	6.81
	Q3	20.50	19.69	22.38	14.34	13.43	15.98	7.57	7.45	7.70	7.58	6.20	8.21
Aimakapa	21	25.93	23.21	26.80	12.78	12.71	13.08	8.40	8.31	8.49	6.98	8.85	7.86
	25	26.16	23.64	26.90	12.56	12.01	12.82	8.36	8.25	8.43	6.72	5.57	7.83
	34	26.08	23.89	26.82	12.73	12.53	12.88	8.31	8.22	8.38	6.91	5.76	7.65
	38	25.89	23.99	26.79	12.66	12.21	12.89	8.21	7.94	8.41	6.06	5.15	7.15
	39	25.79	23.21	26.81	12.75	12.50	12.92	8.36	8.14	8.46	6.51	5.78	7.44
	40	25.78	23.45	26.63	12.67	12.39	12.95	8.25	8.04	8.47	6.51	5.01	7.28
	41	25.81	23.70	26.68	12.67	12.46	12.88	8.17	8.01	8.41	6.24	4.97	6.99
	45	24.68	23.58	25.56	11.75	11.01	12.65	7.69	7.24	8.34	5.79	3.99	7.54
	51	25.98	24.16	26.99	12.57	12.20	12.75	8.14	7.82	8.39	5.95	4.27	6.94
	52	25.31	24.46	26.99	12.26	12.07	12.42	8.09	7.83	8.23	6.06	4.50	6.53
	59	25.37	23.44	25.71	12.37	11.81	12.72	7.94	7.25	8.27	5.33	2.30	6.52
	60	25.76	24.40	26.50	12.37	11.87	12.71	7.82	7.41	8.26	5.00	1.74	6.43
Pools	11	21.43	20.38	21.89	10.36	10.45	12.06	7.99	7.85	8.06	8.10	7.60	8.61
	13	20.62	20.21	21.42	11.37	10.25	11.99	7.90	7.83	7.95	6.89	6.71	7.23
	14	20.89	20.07	21.53	10.50	9.26	10.90	7.91	7.87	8.00	7.51	7.27	7.64
	15	20.66	20.06	21.38	9.31	8.94	9.86	7.97	7.88	8.03	7.69	7.20	8.06
	16	19.93	19.70	20.19	9.46	8.98	9.93	7.96	7.90	8.10	7.82	7.62	7.92
	17	20.36	19.92	20.63	8.86	8.03	9.42	8.01	7.95	8.09	8.04	7.77	8.77
	34	19.81	19.60	20.56	10.13	9.19	10.82	7.95	7.92	7.98	7.41	7.24	8.07
	123	22.11	21.57	23.59	8.00	7.81	8.39	7.85	7.73	8.51	7.59	6.56	8.01
Wells	4061-01	20.93	20.63	21.68	11.51	10.64	12.00	7.92	7.83	8.04	6.27	5.64	7.00
	4161-01	20.62	20.32	21.60	6.70	6.38	6.95	7.23	7.16	7.42	7.91	7.61	8.35
	4161-02	20.58	20.13	21.27	5.18	5.05	5.38	7.90	7.81	8.05	8.24	7.85	8.52

Hydrological forces, i.e., the mixing of low-salinity high-nutrient groundwater, and the high-salinity low-nutrient seawater, primarily dictate chemical conditions within the aquatic habitats of the KAHO site. This is readily evident in the plots of inorganic nutrients and salinity for the various water types. Using all data points, Figure 18 shows the silicate versus salinity distributions for all water types. Because silicate concentrations are very high relative to biological demand, silicate levels are exceptionally well correlated with corresponding salinity between the freshwater-seawater continuum ranging from 850uM SiO₂ and 0ppt salinity to 2.4uM SiO₂ and 34.5 ppt, respectively. Figure 18 shows the close grouping of points within the various water types involved and the distribution of these groups along the x-axis of increasing salinity indicating progressively greater contributions of seawater influence. Using monthly mean values, Figure 19a and b show similar distributions for the oxidized inorganic parameters nitrate and phosphate, albeit with notable [biologically-mediated] reductions in the case of Aimakapa. No such pattern is evident (Figure 19c) for the reduced nitrogenous ion, ammonium because of its relatively low concentrations in the groundwater, and the relatively greater influence of biological forces on ammonium concentrations.

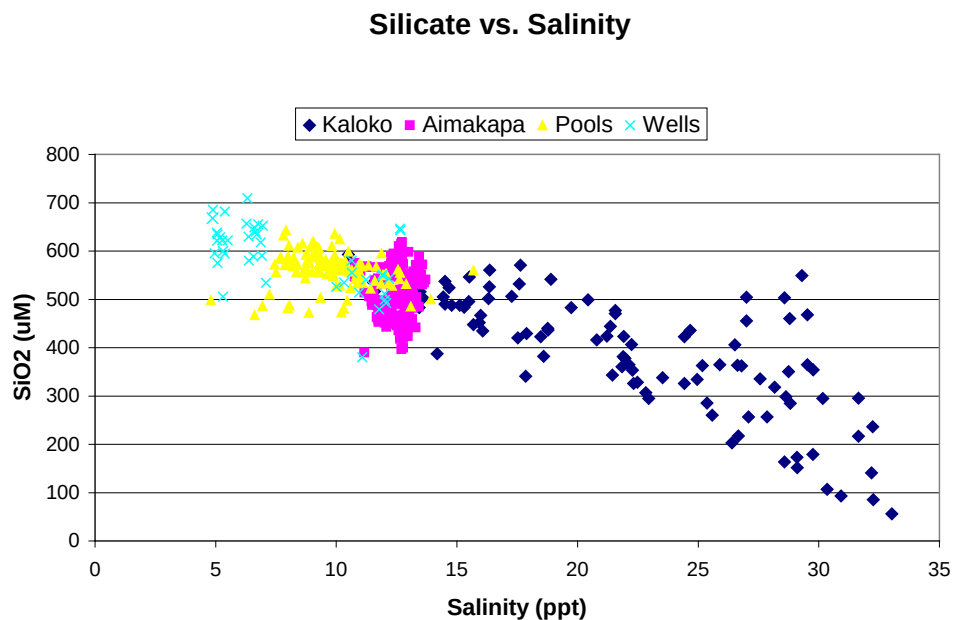


Figure 18

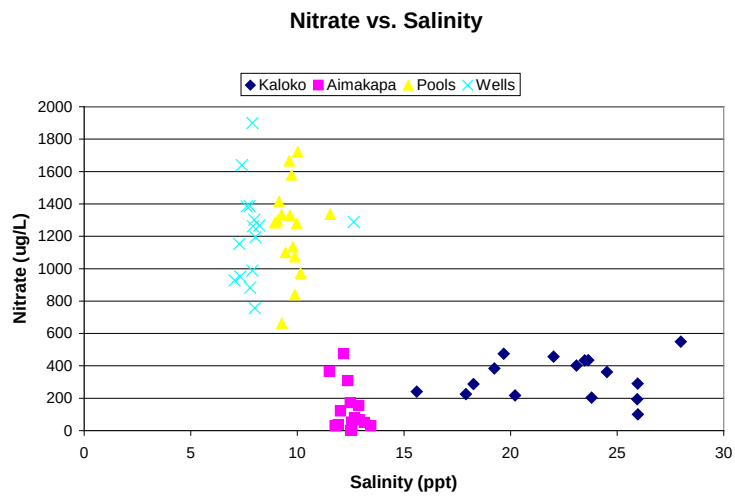


Figure 19a.

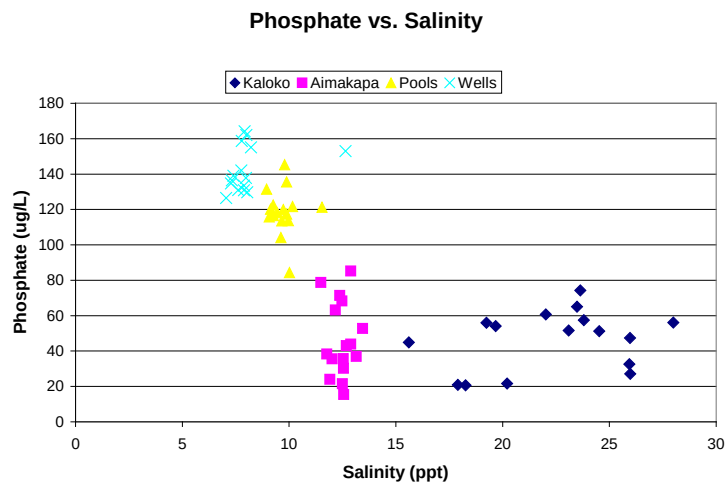


Figure 19b.

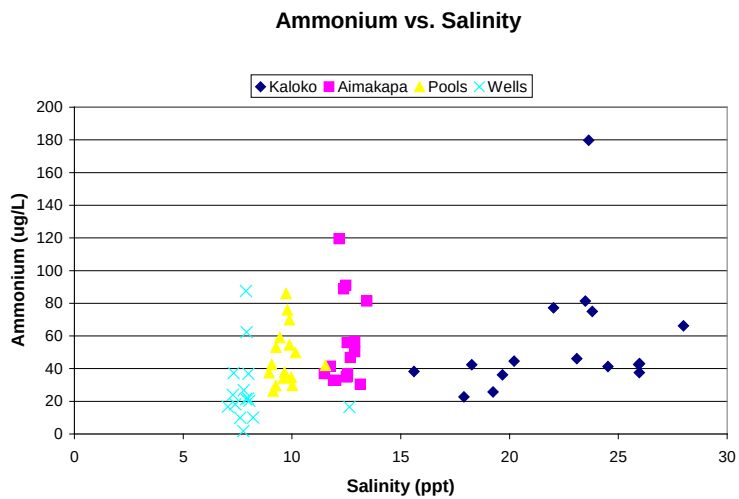


Figure 19c.

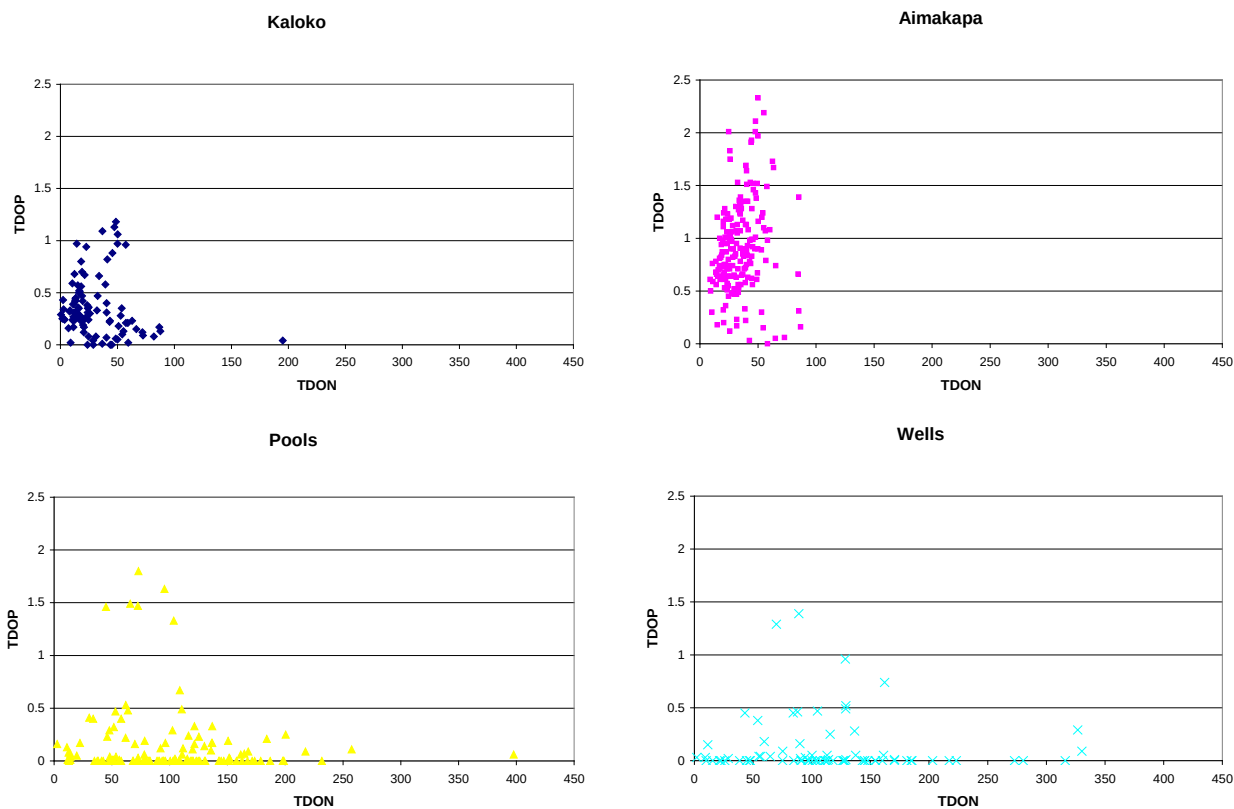
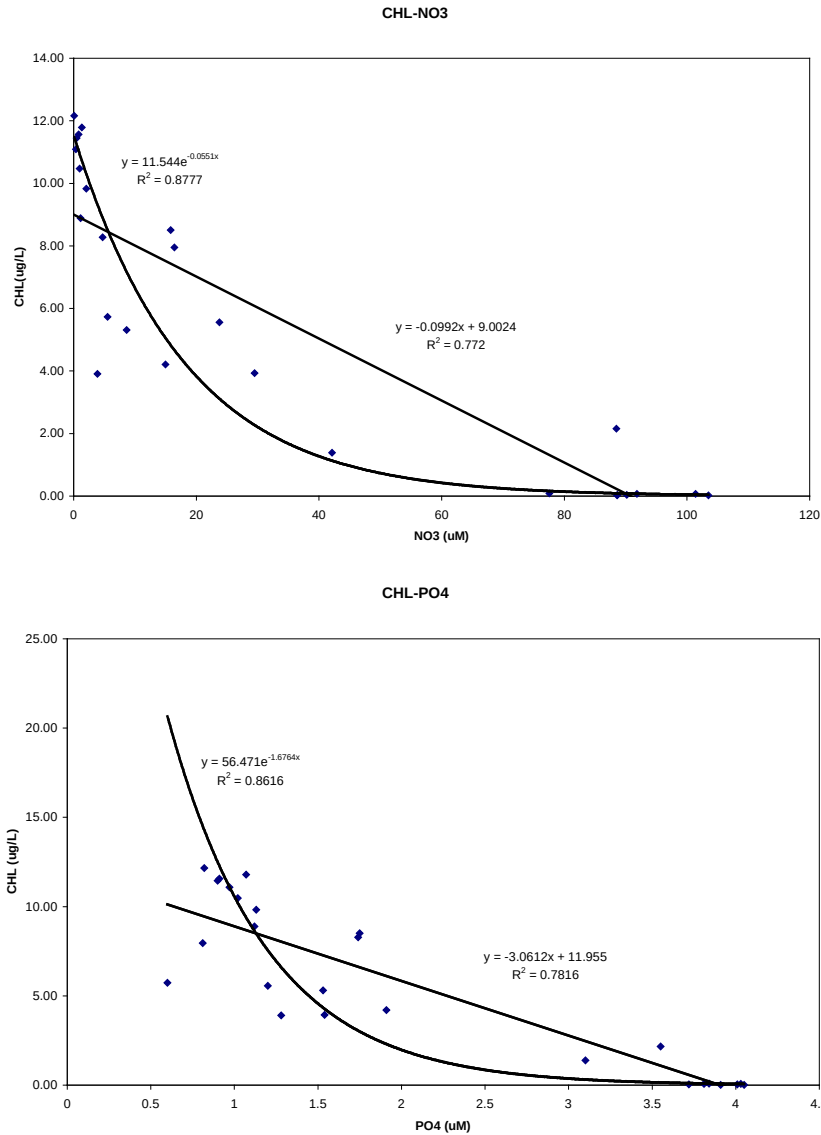


Figure 20. Distributions of DOP and DON for all samples from all water body types.

The wells and pools show a wide range of concentrations of TDON, but relatively low levels of TDOP throughout the study. By contrast, Kaloko fishpond showed low levels of TDON, little variation, and somewhat higher TDOP levels. Aimakapa also showed low and constant TDON levels, but considerable range in TDOP values. These differences in the TDON-TDOP distributions reflect a greater degree of microbial metabolism in the Kaloko and especially Aimakapa environments.



Figures 21 a and b above show distributions of chlorophyll versus those of inorganic nitrate and phosphate sampled within the various habitats throughout this study. Generally, the distributions show conditions of highest inorganic nutrient concentrations when chlorophyll was lowest, and lowest inorganic nutrient concentrations when chlorophyll was highest. These data were fit to both linear and logarithmic equations. In the case of both NO₃ and PO₄ the R-squared values for the logarithmic fits were substantially better than those for the linear fits. As shown above by the salinity-silicate distribution (Figure 18), the effects of groundwater-seawater mixing is linear. The accelerated rate of decline in inorganic nutrient concentrations showed the additional forces of biological uptake to those of hydrological mixing in influence these distributions.

Data in the Tables and Figures above describe hydrographic and water quality conditions in the wells and anchialine pools that appear to be typical of other areas (e.g. Ke-ahole Point, Kailua-Kona, Keauhou) along the Kona coast of the Island of Hawaii (Dollar and Nance, in prep., Oki, 1991; Oki et al., 1999). Despite developments and a commensurate number of wells along this coast, there is not an abundance of comparable water quality data on the groundwater resources in the area. This is because the hydrological sampling normally does not include the detailed nutrient chemistry assessed in this study, unless specific issues pertaining to influences to downstream aquatic resources require such additional analyses. Features embraced within this characteristic condition include the following: concentrations of oxidized plant nutrients (e.g., nitrate, phosphate, silicate) similar to those found in wells of similar salinity elsewhere, concentrations of oxidized nutrients that are high in comparison to levels commonly encountered in surface marine or freshwater aquatic; trends in concentrations of oxidized nutrients that generally decrease linearly with salinity; low concentrations of organic nitrogen, phosphorous, reduced inorganic nitrogen (e.g., ammonium), and concentrations that display modest temporal variation except as influenced contemporaneously by variations in salinity. Taking into account modest spatial differences in upstream nutrient concentrations, comparisons of the water quality conditions for anchialine pools within the Park, likewise appear similar to those in pools located in elsewhere in the Kona area. Contrasting the water quality conditions within Kaloko and Aimakapa fishponds to other areas is difficult due to the relatively unique conditions represented.

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Appendices

Appendix A. Summary of Water Quality results for all stations and parameters, and sampling occasions during the July 2004 to August 2006. Water Quality parameters include ammonium (NH₄), nitrate + nitrite (NO₃+NO₂), phosphate (PO₄), silicate (SiO₂), total dissolved organic nitrogen (TON), total dissolved organic phosphate (TOP), and chlorophyll a. NaN= Not a Number.

Appendix A. Summary of **Nitrate** (uM) results for all sampling locations and sampling dates within the July 2004 - August 2006 period. Data are grouped according to the distinct water body types found within the Kaloko-Honokohau National Historical Park. NaN = Not a Number.

			7/23/2004	10/1/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/2005	8/25/2005	9/20/2005	10/21/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006	MEAN	SD	RSD
Kaloko	J10	uM	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	11.88	0.32	20.2	0.1	7.23	7.59	0.10	6.77	7.50	1.11
	F17	uM	NaN	20.67	10.44	5.71	9.04	10.43	15.69	23.61	1.39	38.49	17.19	39.8	18.68	2.79	31.72	41.64	3.78	21.54	0.10	17.37	13.43	0.77
	G6	uM	NaN	0.10	1.25	6.14	1.10	7.55	2.40	4.92	2.27	15.14	37.86	8.3	11.16	0.1	12.12	0.1	16.1	0.1	1.15	7.10	9.36	1.32
	G18	uM	NaN	38.1	20.97	39.72	1.99	16.47	11.46	24.96	4.08	23.62	32.01	30.18	49.98	28.8	56.4	45.75	38.36	25.56	45.00	29.63	15.25	0.51
	M6	uM	NaN	0.10	22.92	34.38	34.00	49.95	8.78	0.1	1.29	41.37	27.05	32.88	30.45	21.36	26.2	9.74	3.32	0.1	7.17	19.51	15.97	0.82
	O6	uM	NaN	17.50	50.90	29.64	17.30	35.70	3.72	2.25	0.2	25.38	33.1	33.8	10.86	28.56	12.6	5.82	9.15	19.41	10.86	19.26	13.88	0.72
	Q3	uM	NaN	50.16	168.40	119.5	91.90	44.60	41.16	41.09	33.65	51.75	39	40.9	51.08	43.1	64.7	20.4	30.9	27.25	56.15	56.43	36.45	0.65
	MEAN			21.11	45.81	39.18	25.89	27.45	13.87	16.16	7.15	32.63	31.04	30.98	28.70	20.79	33.96	20.58	15.55	14.51	17.22			
	SD			20.14	62.34	41.90	34.54	18.30	14.24	16.32	13.05	13.53	8.03	11.86	18.35	16.58	22.12	19.14	13.87	11.70	23.36			
RSD			0.95	1.36	1.07	1.33	0.67	1.03	1.01	1.83	0.41	0.26	0.38	0.64	0.80	0.65	0.93	0.89	0.81	1.36				
Aimakapa	21	uM	1.86	6.76	0.97	0.1	0.10	0.10	3.07	0.1	0.1	0.10	0.1	3.12	1.54	3.82	1.24	0.1	0.1		1.21	1.36	1.81	1.33
	25	uM	1.63	0.10	0.10	0.78	0.70	0.10	3.43	2.43	0.83	0.10	0.1	4.12	1.31	2.36	2.83	0.1	0.1	0.1	1.03	1.17	1.28	1.09
	34	uM	0.1	1.87	0.10	2.07	3.55	0.1	3.60	1.99	0.66	2.64	15.86	1.05	5.58	1.52	0.1	0.1	0.1	1.17	2.22	3.64	1.64	
	38	uM	2.75	0.10	0.69	5.92	0.10	0.10	4.09	3.18	0.84	0.10	1.14	1.17	0.1	4.85	0.1	0.1	0.1	0.1	0.90	1.39	1.84	1.32
	39	uM	4.86	2.50	0.10	9.65	0.10	0.10	5.04	2.83	0.75	0.10	0.1	1.02	0.1	9.08	1.37	0.1	0.1	0.1	0.62	2.03	3.02	1.49
	40	uM	0.1	3.07	3.27	11.7	0.38	0.1	2.58	3.46	1.12	0.10	22.98	0.82	1.39	6.46	0.1	0.1	0.1	0.1	1.82	3.14	5.60	1.78
	41	uM	0.1	0.10	0.10	14.00	0.10	0.10	1.13	3.27	0.54	10.36	35.52	5.11	9.77	4.33	0.1	0.1	0.1	0.1	1.12	4.53	8.59	1.90
	45	uM	17.26	10.63	0.10	77.00	4.24	5.2	7.99	0.1	2.02	15.58	90.3	70.8	29.05	0.1	4.22	0.1	0.1	0.1	19.74	18.66	28.38	1.52
	51	uM	15.09	0.10	0.10	53.10	6.24	0.1	0.10	4.08	0.66	19.8	57.75	23.35	1.05	3.09	8.59	0.1	0.1	0.1	0.10	10.19	17.46	1.71
	52	uM	0.28	12.15	8.34	40.40	53.00	16.53	7.42	6.36	0.97	19.49	41.31	40.74	15.75	6.14	15.97	0.1	0.1	0.1	21.32	16.13	16.37	1.02
	59	uM	20.01	28.65	6.18	NaN	31.90	0.10	0.10	3.89	2.79	38.85	83.6	50.4	39.25	0.1	11.03	0.1	0.1	4.48	0.90	17.91	23.32	1.30
	60	uM	20.5	17.17	2.64	72.00	3.21	2.63	6.18	0.1	0.1	40.25	57.75	62.8	28.25	0.1	11.12	0.1	0.1	18.21	16.71	18.94	23.06	1.22
	MEAN		7.05	6.93	1.89	26.07	8.64	2.11	3.73	2.65	0.95	12.29	33.88	22.04	11.10	3.50	4.73	0.10	0.10	2.14	5.55			
	SD		8.46	8.86	2.76	29.25	16.55	4.81	2.60	1.88	0.76	14.91	32.74	26.85	13.77	2.85	5.52	0.00	0.00	5.49	8.33			
	RSD		1.20	1.28	1.46	1.12	1.92	2.28	0.70	0.71	0.80	1.21	0.97	1.22	1.24	0.82	1.17	0.00	0.00	2.56	1.50			
Pools	11	uM	NaN	NaN	NaN	122.4	79.8	70.4	66.90	84.6	77.8	73.9	72	81.9	82.8	82.8	79.4	77.3	41.3	65.50	66.30	76.57	16.17	0.21
	13	uM	93.75	NaN	79.3	89.9	93.7	78	66.90	111	94.5	90.9	94.1	70.8	94.7	84.8	87.4	76.1	53	68.90	90.00	84.32	13.61	0.16
	14	uM	99.65	NaN	169.6	125.3	110.5	80.4	75.70	111.4	101.9	85.2	125	106.9	101.4	96.2	84.7	88.4	NaN	80.60	109.90	103.10	22.76	0.22
	15	uM	98.25	81.2	99.1	175.2	176.4	82.2	62.60	96.5	96.6	90.95	127	72.7	86.5	73	92.7	96.7	53.9	77.30	92.70	96.39	32.12	0.33
	16	uM	97.55	89.1	87.2	109.4	115	83.2	63.80	93	93.1	106.6	126.9	74.5	85.8	91.4	99.2	79.2	53.2	45.85	83.60	88.29	20.01	0.23
	17	uM	98.3	92.9	98.1	110.8	107.3	83.9	64.70	105.4		61.8	139.7	70.1	112.7	99.3	87.8	81.8	NaN	42.50	92.60	91.16	22.86	0.25
	34	uM	95.25	100.3	130.7	127.7	86.4	104.1	66.50	103.5	103.5	94.45	144.4	72.2	107	109.1	133.3	85.2	NaN	56.90	90.90	100.63	23.32	0.23
	123	uM	NaN	NaN	NaN	NaN	183	158.8	88.50	102.8	100.9	45.05	73.3	64.7	87.78	93.8	97.6	43.47	35.6	42.00	106.70	88.27	41.70	0.47
	MEAN		97.13	90.88	110.67	122.96	119.01	92.63	69.45	101.03	95.47	81.11	112.80	76.73	94.84	91.30	95.26	78.52	47.40	59.94	91.59			
	SD		2.20	7.95	33.77	26.40	39.38	28.39	8.66	9.18	8.71	19.86	28.90	13.11	11.06	11.09	16.71	15.67	8.42	15.46	13.48			
	RSD		0.02	0.09	0.31	0.21	0.33	0.31	0.12	0.09	0.09	0.24	0.26	0.17	0.12	0.12	0.18	0.20	0.18	0.26	0.15			
Wells	W4258-03	uM	NaN	NaN	NaN	NaN	NaN	55.9	56.65	77.7	66.8	69.7	52.7	75.3	71.46	82.9	78.9	74.3	43.8	57.00	71.70	66.77	11.61	0.17
	W4158-02	uM	NaN	NaN	85.3	93.4	151.6	87.9	64.30	101.9	82.1	73.85	67	66.5	90.48	89.1	94.3	81.2	49.6	51.10	76.00	82.68	23.14	0.28
	4061-01	uM	NaN	NaN	NaN	98.6	60.1	81.2	52.00	86.3	72.1	50.55	121.4	51.6	53.2	81.8	97.4	92.7	69.84	45.55	79.30	74.60	21.64	0.29
	4161-01	uM	NaN	NaN	NaN	144.8	50.4	62.7	60.50	92.7	78.6	88.9	124.9	70.1	86.6	84.8	86	74.5	NaN	41.10	76.80	81.56	26.36	0.32
	4161-02	uM	NaN	NaN	NaN	107.8	88.4	103.4	91.40	117.8	110.9	131	160.6	90.2	116.2	112.4	113.6	108.8	56.3	75.45	115.30	106.22	23.45	0.22
	MEAN					111.15	87.63	78.22	64.97	95.28	82.10	82.80	105.32	70.74	83.59	90.20	94.04	86.30	54.89	54.04	83.82			
	SD					23.21	45.60	19.21	15.46	15.39	17.14	30.22	44.54	14.00	23.40	12.72	13.11	14.63	11.20	13.37	17.81			
RSD					0.21	0.52	0.25	0.24	0.16	0.21	0.36	0.42	0.20	0.28	0.14	0.14	0.17	0.20	0.25	0.21				

Appendix A (continued). Summary of **Nitrate** (ug/L) results for all sampling locations and sampling dates within the July 2004 - August 2006 period. Data are grouped according to the distinct water body types found within the Kaloko-Honokohau National Historical Park. NaN = Not a Number.

			7/23/2004	10/1/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/2005	8/25/2005	9/20/2005	10/21/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006	MEAN	SD	RSD
Kaloko	J10	ug/L													166.32	4.48	282.8	1.4	101.22	106.26	1.4	94.84	105.07	1.11
	F17	ug/L		289.38	146.16	79.94	126.56	146.02	219.66	330.54	19.46	538.86	240.66	557.2	261.52	39.06	444.08	582.96	52.92	301.56	1.4	243.22	188.08	0.77
	G6	ug/L		1.4	17.5	85.96	15.4	105.7	33.6	68.88	31.78	211.96	530.04	116.2	156.24	1.4	169.68	1.4	225.4	1.4	16.1	99.45	130.97	1.32
	G18	ug/L		533.4	293.58	556.08	27.86	230.58	160.44	349.44	57.12	330.68	448.14	422.52	699.72	403.2	789.6	640.5	537.04	357.84	630	414.87	213.48	0.51
	M6	ug/L		1.4	320.88	481.32	476	699.3	122.92	1.4	18.06	579.18	378.7	460.32	426.3	299.04	366.8	136.36	46.48	1.4	100.38	273.12	223.63	0.82
	O6	ug/L		245	712.6	414.96	242.2	499.8	52.08	31.5	2.8	355.32	463.4	473.2	152.04	399.84	176.4	81.48	128.1	271.74	152.04	269.69	194.33	0.72
	Q3	ug/L		702.24	2357.6	1673	1286.6	624.4	576.24	575.26	471.1	724.5	546	572.6	715.12	603.4	905.8	285.6	432.6	381.5	786.1	789.98	510.26	0.65
	MEAN			295.47	641.39	548.54	362.44	384.30	194.16	226.17	100.05	456.75	434.49	433.67	401.82	290.99	475.39	288.05	217.68	203.10	241.06			
	SD			282.00	872.77	586.58	483.62	256.22	199.41	228.52	182.68	189.49	112.49	165.98	256.86	232.14	309.71	267.97	194.20	163.77	326.99			
RSD			0.95	1.36	1.07	1.33	0.67	1.03	1.01	1.83	0.41	0.26	0.38	0.64	0.80	0.65	0.93	0.89	0.81	1.36				
Aimakapa	21	ug/L	26.04	94.64	13.58	1.4	1.4	1.4	42.98	1.4	1.4	1.4	1.4	43.68	21.56	53.48	17.36	1.4	1.4	0	16.94	18.05	25.08	1.39
	25	ug/L	22.82	1.4	1.4	10.92	9.8	1.4	48.02	34.02	11.62	1.4	1.4	57.68	18.34	33.04	39.62	1.4	1.4	1.4	14.42	16.39	17.91	1.09
	34	ug/L	1.4	26.18	1.4	28.98	49.7	1.4	50.4	27.86	9.24	36.96	222.04	14.7	78.12	21.28	1.4	1.4	1.4	16.38	31.14	50.93	1.64	
	38	ug/L	38.5	1.4	9.66	82.88	1.4	1.4	57.26	44.52	11.76	1.4	15.96	16.38	1.4	67.9	1.4	1.4	1.4	12.6	19.47	25.76	1.32	
	39	ug/L	68.04	35	1.4	135.1	1.4	1.4	70.56	39.62	10.5	1.4	1.4	14.28	1.4	127.12	19.18	1.4	1.4	1.4	8.68	28.46	42.30	1.49
	40	ug/L	1.4	42.98	45.78	163.8	5.32	1.4	36.12	48.44	15.68	1.4	321.72	11.48	19.46	90.44	1.4	1.4	1.4	25.48	44.03	78.43	1.78	
	41	ug/L	1.4	1.4	1.4	196	1.4	1.4	15.82	45.78	7.56	145.04	497.28	71.54	136.78	60.62	1.4	1.4	1.4	15.68	63.41	120.31	1.90	
	45	ug/L	241.64	148.82	1.4	1078	59.36	72.8	111.86	1.4	28.28	218.12	1264.2	991.2	406.7	1.4	59.08	1.4	1.4	1.4	276.36	261.31	397.28	1.52
	51	ug/L	211.26	1.4	1.4	743.4	87.36	1.4	1.4	57.12	9.24	277.2	808.5	326.9	14.7	43.26	120.26	1.4	1.4	1.4	1.4	142.65	244.44	1.71
	52	ug/L	3.92	170.1	116.76	565.6	742	231.42	103.88	89.04	13.58	272.86	578.34	570.36	220.5	85.96	223.58	1.4	1.4	1.4	298.48	225.82	229.24	1.02
	59	ug/L	280.14	401.1	86.52	NaN	446.6	1.4	1.4	54.46	39.06	543.9	1170.4	705.6	549.5	1.4	154.42	1.4	1.4	62.72	12.6	250.78	326.50	1.30
	60	ug/L	287	240.38	36.96	1008	44.94	36.82	86.52	1.4	1.4	563.5	808.5	879.2	395.5	1.4	155.68	1.4	1.4	254.94	233.94	265.20	322.89	1.22
	NaN		98.63	97.07	26.47	364.92	120.89	29.47	52.19	37.09	13.28	172.05	474.26	308.58	155.33	48.94	66.23	1.40	1.40	27.52	77.75			
	NaN		118.50	124.10	38.68	409.54	231.68	67.29	36.46	26.26	10.69	208.77	458.37	375.86	192.84	39.95	77.24	0.00	0.00	73.77	116.66			
	NaN		1.20	1.28	1.46	1.12	1.92	2.28	0.70	0.71	0.80	1.21	0.97	1.22	1.24	0.82	1.17	0.00	0.00	2.68	1.50			
Pools	11	ug/L	NaN	NaN	NaN	1713.6	1117.2	985.6	936.6	1184.4	1089.2	1034.6	1008	1146.6	1159.2	1159.2	1111.6	1082.2	578.2	917	928.2	1071.96	226.41	0.21
	13	ug/L	1312.5	NaN	1110.2	1258.6	1311.8	1092	936.6	1554	1323	1272.6	1317.4	991.2	1325.8	1187.2	1223.6	1065.4	742	964.6	1260	1180.47	190.57	0.16
	14	ug/L	1395.1	NaN	2374.4	1754.2	1547	1125.6	1059.8	1559.6	1426.6	1192.8	1750	1496.6	1419.6	1346.8	1185.8	1237.6	NaN	1128.4	1538.6	1443.44	318.68	0.22
	15	ug/L	1375.5	1136.8	1387.4	2452.8	2469.6	1150.8	876.4	1351	1352.4	1273.3	1778	1017.8	1211	1022	1297.8	1353.8	754.6	1082.2	1297.8	1349.53	449.64	0.33
	16	ug/L	1365.7	1247.4	1220.8	1531.6	1610	1164.8	893.2	1302	1303.4	1492.4	1776.6	1043	1201.2	1279.6	1388.8	1108.8	744.8	641.9	1170.4	1236.13	280.11	0.23
	17	ug/L	1376.2	1300.6	1373.4	1551.2	1502.2	1174.6	905.8	1475.6	0	865.2	1955.8	981.4	1577.8	1390.2	1229.2	1145.2	NaN	595	1296.4	1205.32	432.35	0.36
	34	ug/L	1333.5	1404.2	1829.8	1787.8	1209.6	1457.4	931	1449	1449	1322.3	2021.6	1010.8	1498	1527.4	1866.2	1192.8	NaN	796.6	1272.6	1408.87	326.55	0.23
	123	ug/L	NaN	NaN	NaN	NaN	2562	2223.2	1239	1439.2	1412.6	630.7	1026.2	905.8	1228.92	1313.2	1366.4	608.58	498.4	588	1493.8	1235.73	583.82	0.47
	MEAN		1359.75	1272.25	1549.33	1721.40	1666.18	1296.75	972.30	1414.35	1169.53	1135.49	1579.20	1074.15	1327.69	1278.20	1333.68	1099.30	663.60	839.21	1282.23			
	SD		30.74	111.32	472.72	369.61	551.32	397.45	121.25	128.55	485.86	278.11	404.59	183.50	154.81	155.22	233.97	219.44	117.90	216.45	188.74			
	RSD		0.02	0.09	0.31	0.21	0.33	0.31	0.12	0.09	0.42	0.24	0.26	0.17	0.12	0.12	0.18	0.20	0.18	0.26	0.15			
Wells	W4258-03	ug/L	NaN	NaN	NaN	NaN	NaN	782.6	793.1	1087.8	935.2	975.8	737.8	1054.2	1000.44	1160.6	1104.6	1040.2	613.2	798	1003.8	934.81	162.56	0.17
	W4158-02	ug/L	NaN	NaN	1194.2	1307.6	2122.4	1230.6	900.2	1426.6	1149.4	1033.9	938	931	1266.72	1247.4	1320.2	1136.8	694.4	715.4	1064	1157.58	323.97	0.28
	4061-01	ug/L	NaN	NaN	NaN	1380.4	841.4	1136.8	728	1208.2	1009.4	707.7	1699.6	722.4	744.8	1145.2	1363.6	1297.8	977.76	637.7	1110.2	1044.44	303.02	0.29
	4161-01	ug/L	NaN	NaN	NaN	2027.2	705.6	877.8	847	1297.8	1100.4	1244.6	1748.6	981.4	1212.4	1187.2	1204	1043	NaN	575.4	1075.2	1141.84	369.10	0.32
	4161-02	ug/L	NaN	NaN	NaN	1509.2	1237.6	1447.6	1279.6	1649.2	1552.6	1834	2248.4	1262.8	1626.8	1573.6	1590.4	1523.2	788.2	1056.3	1614.2	1487.11	328.36	0.22
	MEAN					1556.10	1226.75	1095.08	909.58	1333.92	1149.40	1159.20	1474.48	990.36	1170.23	1262.80	1316.56	1208.20	768.39	756.56	1173.48			
	SD					324.94	638.33	268.90	216.48	215.45	240.03	423.04	623.55	196.03	327.63	178.06	183.58	204.86	156.83	187.22	249.34			
	RSD					0.21	0.52	0.25	0.24	0.16	0.21	0.36	0.42	0.20	0.28	0.14	0.14	0.17	0.20	0.25	0.21			

Appendix A (continued). Summary of Water Quality results for all stations and parameters, and sampling occasions during the July 2004 to August 2006 -- **Chlorophyll a**. Data are grouped according to the distinct water body types found within the Kaloko-Honokohau National Historic Park.

NaN = Not a Number.

		7/23/2004	9/30/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/2005	8/25/2005	9/20/2005	10/20/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006	MEAN	SD	RSD	
Kaloko	M6	ug/L	NaN	2.96	1.94	0.88	4.74	3.65	2.43	14.52	2.13	8.94	0.72	0.58	2.66	12.94	6.38	10.63	10.17	16.37	24.55	7.07	6.66	0.94
	G6	ug/L	NaN	2.77	3.28	1.34	5.89	2.53	0.60	2.54	5.41	16.22	7.49	9.01	4.04	10.63	7.09	9.45	5.57	48.42	0.24	7.92	10.88	1.37
	F17	ug/L	NaN	4.71	2.98	2.46	6.24	4.02	3.81	19.36	18.37	9.71	6.93	3.47	4.04	11.32	2.60	10.63	9.44	8.96	20.83	8.33	5.91	0.71
	G18	ug/L	NaN	3.88	2.61	1.19	2.20	6.55	1.85	11.55	18.30	0.83	1.59	3.24	2.54	4.62	2.01	9.64	5.08	7.26	14.88	5.55	5.02	0.90
	O6	ug/L	NaN	4.07	0.69	0.74	4.04	1.49	4.39	19.26	1.87	5.62	1.80	1.59	3.35	5.20	8.27	12.48	7.26	2.31	7.47	5.11	4.69	0.92
	Q3	ug/L	NaN	0.21	0.12	0.18	0.53	1.94	n.d.	19.36	15.53	0.25	1.18	0.12	0.16	1.39	0.09	2.60	3.15	2.23	20.83	4.11	7.04	1.71
	J10	ug/L	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	10.40	9.22	13.89	10.41	50.84	26.15	20.15	16.29	0.81
	MEAN		3.10	1.93	1.13	3.94	3.36	2.62	14.43	10.27	6.93	3.29	3.00	2.80	8.07	5.09	9.90	7.30	19.48	16.42				
	SD		1.59	1.28	0.76	2.21	1.84	1.52	6.66	7.98	6.03	3.07	3.24	1.45	4.30	3.50	3.59	2.82	21.15	9.52				
	RSD		0.51	0.66	0.68	0.56	0.55	0.58	0.46	0.78	0.87	0.93	1.08	0.52	0.53	0.69	0.36	0.39	1.09	0.58				
Aimakapa	21	ug/L	6.29	12.21	14.52	17.56	16.29	14.59	8.09	6.47	4.99	10.26	1.48	4.44	11.09	24.49	13.23	11.81	13.07	20.34	12.50	11.78	5.72	0.49
	25	ug/L	6.29	3.70	17.12	19.87	16.98	11.32	10.17	5.78	3.88	11.09	1.76	2.22	13.40	19.87	11.81	11.81	11.14	22.76	11.90	11.20	6.20	0.55
	34	ug/L	9.37	8.93	0.71	18.49	22.34	14.00	6.70	8.09	2.77	6.66	0.97	2.81	11.09	12.48	14.65	10.54	12.59	20.34	12.50	10.32	6.18	0.60
	38	ug/L	4.48	5.06	12.42	12.02	14.56	11.02	5.08	5.08	5.27	8.04	1.80	2.87	11.55	14.33	11.34	12.29	12.11	16.95	13.69	9.47	4.53	0.48
	39	ug/L	5.34	12.21	17.50	11.09	15.60	14.00	7.16	8.09	6.66	6.66	1.29	4.44	11.09	11.09	17.96	13.23	19.37	17.92	12.50	11.22	5.15	0.46
	40	ug/L	10.87	10.42	17.50	14.15	13.87	13.40	6.47	5.55	4.16	6.66	0.69	2.03	7.39	7.86	18.90	13.70	13.07	16.95	14.88	10.45	5.33	0.51
	41	ug/L	10.49	10.42	10.00	7.24	11.44	33.95	9.71	5.08	5.20	4.99	0.65	1.76	8.32	11.09	9.45	15.12	12.59	7.75	10.71	9.79	6.89	0.70
	45	ug/L	1.27	9.83	15.26	0.24	12.83	10.13	14.89	6.24	3.60	1.36	0.37	0.43	8.32	13.87	14.65	14.65	12.59	8.23	3.12	7.99	5.71	0.71
	51	ug/L	1.59	9.23	20.10	1.89	12.13	10.13	12.66	6.01	6.10	2.13	0.65	1.11	9.24	12.02	14.56	17.01	17.43	14.04	9.52	9.34	6.00	0.64
	52	ug/L	9.53	9.83	11.17	6.01	9.36	10.13	3.47	9.01	4.44	7.49	4.85	1.29	5.08	13.40	8.51	11.81	NaN	13.07	9.23	8.20	3.38	0.41
	59	ug/L	0.43	1.57	12.66	0.74	16.29	9.53	3.93	6.70	3.88	0.45	0.69	0.31	1.20	17.56	13.23	10.40	11.62	1.93	1.45	6.03	5.96	0.99
	60	ug/L	3.67	3.97	13.77	0.31	12.48	5.66	NaN	5.31	3.88	0.40	0.60	0.48	0.37	18.02	32.14	12.76	12.59	1.71	6.78	7.50	8.29	1.11
	MEAN		5.80	8.12	13.56	9.13	14.51	13.15	8.03	6.45	4.57	5.52	1.32	2.02	8.18	14.67	15.04	12.93	13.47	13.50	9.90			
	SD		3.67	3.58	5.01	7.41	3.36	7.01	3.57	1.30	1.11	3.68	1.21	1.42	4.10	4.57	6.19	1.94	2.54	7.11	4.18			
	RSD		0.63	0.44	0.37	0.81	0.23	0.53	0.44	0.20	0.24	0.67	0.92	0.71	0.50	0.31	0.41	0.15	0.19	0.53	0.42			
Pools	11	ug/L	NaN	0.01	NaN	0.02	1.10	0.05	0.04	0.11	0.25	0.07	0.06	0.04	0.03	0.22	0.20	0.19	0.27	0.06	0.35	0.18	0.26	1.43
	13	ug/L	NaN	0.01	0.02	0.01	0.82	0.02	NaN	0.04	0.71	0.04	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.21	0.34	1.64	
	14	ug/L	NaN	0.03	NaN	0.04	0.66	0.07	NaN	NaN	0.67	0.05	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.25	0.32	1.26	
	15	ug/L	0.09	0.07	0.05	0.05	0.57	0.04	0.05	0.03	0.02	0.10	0.08	0.11	0.17	0.21	0.04	0.06	0.11	0.07	0.07	0.10	0.12	1.17
	16	ug/L	0.01	0.01	0.03	0.01	0.18	0.01	0.01	0.03	0.01	0.02	0.01	0.04	0.02	0.03	0.02	0.07	0.08	0.05	0.01	0.03	0.04	1.20
	17	ug/L	0.04	0.01	0.10	0.00	0.79	0.03	0.14	0.04	0.02	0.01	0.01	0.01	0.08	0.16	0.04	0.28	NaN	0.02	0.01	0.10	0.19	1.83
	34	ug/L	NaN	0.01	NaN	0.00	0.08	0.01	0.03	0.03	0.01	0.01	0.01	0.01	0.02	0.03	0.02	0.13	NaN	0.03	0.02	0.03	0.03	1.15
	123	ug/L	3.28	NaN	10.24	1.45	95.33	1.12	3.81	2.09	9.72	2.20	0.31	2.11	1.10	1.10	0.39	5.43	3.81	10.41	27.84	10.10	22.26	2.20
	MEAN		0.86	0.02	2.09	0.20	12.44	0.17	0.68	0.34	1.63	0.31	0.08	0.39	0.24	0.29	0.12	1.03	1.07	1.77	4.72			
	SD		1.62	0.02	4.56	0.51	33.49	0.38	1.53	0.77	3.58	0.76	0.12	0.85	0.43	0.40	0.15	2.16	1.83	4.23	11.33			
	RSD		1.89	1.06	2.18	2.54	2.69	2.28	2.26	2.28	2.20	2.43	1.46	2.19	1.80	1.39	1.27	2.10	1.71	2.39	2.40			

Appendix A. (con't) Summary of **Dissolved Organic Nitrogen** (uM) results for all sampling locations and sampling dates within the July 2004 - August 2006 period. Data are grouped according to the distinct water body types found within the Kaloko-Honokohau National Historic Park. NaN = Not a Number.

			7/23/2004	10/1/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/2005	8/25/2005	9/20/2005	10/21/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006	MEAN	SD	RSD
Kaloko	J10		NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	7.87	45.25	22.71	19.91	17.29	21.3	19.01	19.2	2.01	0.10
	F17	uM	NaN	31.8	6.92	7.16	13.52	7.96	13.67	0.5	18.14	32.6	45.63	14.26	16.16	24.88	53.75	40.49	20.53	28.75	16.56	21.85	14.47	0.66
	G6	uM	NaN	16.5	13.66	8.93	2.29	11.17	17.82	1.69	19	24.66	22.72	10.69	11.42	16.18	25.88	23.62	19.95	12.25	15.2	15.20	6.98	0.46
	G18	uM	NaN	36.97	74.34	72.34	51.06	12.84	23.83	2.97	18.22	48.59	50	8.5	39.47	43.21	86.78	32.09	52.82	33.89	41.1	40.50	22.79	0.56
	M6	uM	NaN	16.3	48.44	40.38	11.47	50.05	14.22	3.64	13.1	28.63	50.21	23.74	20.75	40.48	11.16	15.32	20.69	16.18	10.46	24.18	15.10	0.62
	O6	uM	NaN	32.18	103.77	62.8	81.94	43.74	18.22	2.82	13.04	36.71	48.69	24.66	11.93	57.29	13.31	12.89	17.34	19.61	36.77	35.43	27.03	0.76
	Q3	uM	NaN	43.84	48.59	194.98	71.92	59.53	54.28	22.02	17	45.16	47.36	31.1	43.38	66.53	87.73	24.1	57.52	55.29	59.12	57.19	38.77	0.68
	MEAN			29.60	49.29	64.43	38.70	30.88	23.67	5.61	16.42	36.06	44.10	18.83	23.85	41.43	46.44	24.75	29.45	26.75	28.32			
	SD			11.11	36.50	69.35	34.14	22.77	15.43	8.12	2.67	9.35	10.61	8.97	14.08	18.96	35.07	10.32	17.68	14.56	17.79			
RSD			0.38	0.74	1.08	0.88	0.74	0.65	1.45	0.16	0.26	0.24	0.48	0.59	0.46	0.76	0.42	0.60	0.54	0.63				
Aimakapa	21	uM	31.74	22.15	6.89	14.39	17.98	23.11	30.86	20.18	36.17	57.7	47.69	50.06	35.01	36.93	22.58	20.43	13.85	NaN	28.19	28.66	13.51	0.47
	25	uM	33.2	24.5	3.91	23.2	17.96	23.61	26.79	26.8	35.78	47.96	44.45	39.78	34.49	40.28	27.3	19.09	13.92	16.83	39.29	28.38	11.44	0.40
	34	uM	28.15	29.33	1.19	25.17	23.41	25.97	31.62	23.31	32.15	49.44	44.13	43.49	44.85	40.92	44.45	22.19	15.62	17.44	34.77	30.40	12.30	0.40
	38	uM	32.51	17.86	14.26	29.45	21.29	26.08	34.82	21.4	33.25	63.44	50.02	40.14	46.04	45.76	32.77	24.67	25.37	17.25	47.86	32.85	13.15	0.40
	39	uM	27.84	22.31	8.92	33.01	19.19	17.02	24.5	31.03	31.27	62.53	47.89	55.1	48.51	47.47	37.81	29.49	25.58	19.89	54.98	33.91	14.92	0.44
	40	uM	34.78	38.51	4.46	33.36	20.43	21.46	58.19	25.33	33.87	25.88	26.07	45.72	53.52	49.85	26.9	24.3	20.56	21.72	34.85	31.57	13.25	0.42
	41	uM	34.48	25.78	9.3	44.67	25.58	28.2	34.68	22.52	20.2	38.2	24.73	28.86	44.75	45.52	41.14	24.39	21.25	19.89	27.63	29.57	9.91	0.34
	45	uM	18.83	35.31	NaN	86.66	14.03	11.22	41.26	24.56	40.4	58.19	60.18	15.01	45.23	43.2	84.6	23.56	22.19	31.32	65.27	40.06	23.11	0.58
	51	uM	23.41	25.22	7.99	65.03	15.72	18.55	52.98	23.81	40.19	38.76	50.27	20.13	40.08	40.63	48.97	33.38	20.95	24.63	30.27	32.68	14.77	0.45
	52	uM	27.01	29.04	6.26	n.d.	9.17	8.74	37.02	17.16	36.96	39.09	32.58	10.25	49.68	42.83	31.59	29.42	23.45	31.66	10.74	26.26	13.11	0.50
	59	uM	26.12	53.67	17.77	n.d.	18.72	28.3	43.71	15	35.23	54.58	32.18	85.19	53.13	41.67	56.82	33.18	36.07	31.8	56.35	39.97	17.65	0.44
	60	uM	28.56	31.99	16.46	72.83	20.88	21.98	39.3	27.65	34.35	42.68	54.28	20.51	39.43	39.7	40.13	27.56	23.5	25.74	35.25	33.83	13.38	0.40
	MEAN			29.64	8.86	42.78	18.70	21.19	37.98	23.23	34.15	48.20	42.87	37.85	44.56	42.90	41.26	25.97	21.86	23.47	38.79			
	SD			9.55	5.30	24.01	4.34	6.29	9.99	4.45	5.22	11.56	11.36	20.82	6.31	3.66	16.84	4.66	6.05	5.94	15.06			
	RSD			0.32	0.60	0.56	0.23	0.30	0.26	0.19	0.15	0.24	0.26	0.55	0.14	0.09	0.41	0.18	0.28	0.25	0.39			
	Pools	11	uM	NaN	NaN	NaN	168.07	171.4	115.27	167.36	2.65	30.32	122.88	103.59	19.56	53.46	119.93	36.32	37.28	69.89	45.99	102.47	85.40	55.87
13		uM	85.39	NaN	201.19	197.86	200.47	89.98	146.86	14.03	47.77	109.05	95.5	34.89	77.1	120.35	39.82	49.16	78.42	51.75	121.47	97.84	58.00	0.59
14		uM	79.28	NaN	180.35	198.8	231.66	119.62	103.04	14.14	53.1	117.84	121.48	11.72	68.52	125.97	76.87	72.48	NaN	48.12	150.5	104.32	61.44	0.59
15		uM	79.48	101.49	285.24	217.48	57.97	68.13	144.6	11.18	51.74	107.96	44.86	40.98	93.5	105.52	76.93	71.51	110.82	50.06	124.72	97.06	64.37	0.66
16		uM	76.39	44.84	232.17	161.56	135.8	96.31	157.87	12.8	57.97	94.98	65.93	38.18	82.96	114.41	54.12	72.65	125.23	81.56	136.44	96.96	52.37	0.54
17		uM	80.49	37.1	193.75	257.45	184.01	103.01	162.66	14.02		142.55	73	42.36	56.42	94.78	78.72	78.04	NaN	47.58	136.84	104.87	65.54	0.62
34		uM	86.71	39.9	243.4	164.56	152.04	91.16	173.49	12.54	61.98	100.45	72.54	55.7	92.07	78.68	37.27	82.9	NaN	79.51	116.33	96.74	56.23	0.58
123		uM	NaN	NaN	397.74	110.46	198.23	178.81	22.39	63.81	151.55	108.74	50.27	111.46	130.06	NaN	33.86	96.27	61.82	136.8	123.48	91.46		0.74
MEAN				55.83	222.68	220.44	155.48	110.21	154.34	12.97	52.38	118.41	85.71	36.71	79.44	111.21	57.15	62.24	96.13	58.30	128.20			
SD				30.61	38.79	78.49	54.55	39.00	23.90	5.38	11.28	19.89	25.69	14.73	19.73	17.34	19.93	19.18	22.72	14.56	15.00			
RSD				0.55	0.17	0.36	0.35	0.35	0.15	0.41	0.22	0.17	0.30	0.40	0.25	0.16	0.35	0.31	0.24	0.25	0.12			
Wells	W4258-03	uM	NaN	NaN	NaN	NaN	145.17	147.72	9.2	43.01	129.1	128.73	21.37	90.43	127.31	181.07	107.22	326.67	56.27	136.52	117.84	79.08	0.67	
	W4158-02	uM	NaN	NaN	294.97	137.5	170.67	217.17	272.97	10.07	87.87	118.12	128.97	46.92	75.29	160.27	184.87	97.62	330.27	64.57	128.22	148.61	88.97	0.60
	4061-01	uM	NaN	NaN	NaN	113.1	100.3	84.73	316.04	11.46	55	143.12	69.81	38.53	28.9	91	115.77	91.15	129.13	90.01	94.5	98.28	68.26	0.69
	4161-01	uM	NaN	NaN	NaN	223.15	126.45	104.64	144.92	1.97	59.57	111.3	88.94	22.67	47.67	113.3	154.27	25.97	NaN	75.06	104.84	93.65	57.79	0.62
	4161-02	uM	NaN	NaN	NaN	170.45	114.28	111.6	202.94	15.55	53.94	161.28	84.22	44.44	103.16	154.25	185.37	96.7	280.29	100.4	162.12	127.56	66.69	0.52
	MEAN					161.05	127.93	132.66	216.92	9.65	59.88	132.58	100.13	34.79	69.09	129.23	164.27	83.73	266.59	77.26	125.24			
	SD					47.60	30.43	52.02	76.05	4.94	16.79	20.06	27.14	12.05	30.53	28.76	30.02	32.80	94.42	18.06	26.73			
RSD					0.30	0.24	0.39	0.35	0.51	0.28	0.15	0.27	0.35	0.44	0.22	0.18	0.39	0.35	0.23	0.21				

Appendix A. (con't) Summary of **Dissolved Organic Nitrogen** (ug/L) results for all sampling locations and sampling dates within the July 2004 - August 2006 period. Data are grouped according to the distinct water body types found within the Kaloko-Honokohau National Historic Park. NaN = Not a Number.

			7/23/2004	10/1/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/2005	8/25/2005	9/20/2005	10/21/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006	MEAN	SD	RSD
Kaloko			NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	110.18	633.5	317.94	278.74	242.06	298.2	266.14	268.8	28.16	0.10
	F17	ug/L	NaN	445.2	96.88	100.24	189.28	111.44	191.38	7	253.96	456.4	638.82	199.64	226.24	348.32	752.5	566.86	287.42	402.5	231.84	305.88	202.57	0.66
	G6	ug/L	NaN	231	191.24	125.02	32.06	156.38	249.48	23.66	266	345.24	318.08	149.66	159.88	226.52	362.32	330.68	279.3	171.5	212.8	212.82	97.70	0.46
	G18	ug/L	NaN	517.58	1040.76	1012.76	714.84	179.76	333.62	41.58	255.08	680.26	700	119	552.58	604.94	1214.92	449.26	739.48	474.46	575.4	567.02	319.02	0.56
	M6	ug/L	NaN	228.2	678.16	565.32	160.58	700.7	199.08	50.96	183.4	400.82	702.94	332.36	290.5	566.72	156.24	214.48	289.66	226.52	146.44	338.50	211.37	0.62
	O6	ug/L	NaN	450.52	1452.78	879.2	1147.16	612.36	255.08	39.48	182.56	513.94	681.66	345.24	167.02	802.06	186.34	180.46	242.76	274.54	514.78	496.00	378.46	0.76
	Q3	ug/L	NaN	613.76	680.26	2729.72	1006.88	833.42	759.92	308.28	238	632.24	663.04	435.4	607.32	931.42	1228.22	337.4	805.28	774.06	827.68	800.68	542.82	0.68
	MEAN			414.38	690.01	902.04	541.80	432.34	331.43	78.49	229.83	504.82	617.42	263.55	333.92	580.00	650.09	346.52	412.28	374.54	396.44			
SD			155.53	511.01	970.90	477.94	318.82	216.00	113.63	37.38	130.94	148.60	125.61	197.07	265.42	491.02	144.53	247.50	203.86	249.10				
RSD			0.38	0.74	1.08	0.88	0.74	0.65	1.45	0.16	0.26	0.24	0.48	0.59	0.46	0.76	0.42	0.60	0.54	0.63				
Aimakapa																								
	21	ug/L	31.74	310.1	96.46	201.46	251.72	323.54	432.04	282.52	506.38	807.8	667.66	700.84	490.14	517.02	316.12	286.02	193.9	NaN	394.66	378.34	207.73	0.55
	25	ug/L	33.2	343	54.74	324.8	251.44	330.54	375.06	375.2	500.92	671.44	622.3	556.92	482.86	563.92	382.2	267.26	194.88	235.62	550.06	374.55	179.45	0.48
	34	ug/L	28.15	410.62	16.66	352.38	327.74	363.58	442.68	326.34	450.1	692.16	617.82	608.86	627.9	572.88	622.3	310.66	218.68	244.16	486.78	406.34	194.86	0.48
	38	ug/L	32.51	250.04	199.64	412.3	298.06	365.12	487.48	299.6	465.5	888.16	700.28	561.96	644.56	604.64	458.78	345.38	355.18	241.5	670.04	437.72	208.61	0.48
	39	ug/L	27.84	312.34	124.88	462.14	268.66	238.28	343	434.42	437.78	875.42	670.46	771.4	679.14	664.58	529.34	412.86	358.12	278.46	769.72	455.73	232.28	0.51
	40	ug/L	34.78	539.14	62.44	467.04	286.02	300.44	814.66	354.62	474.18	362.32	364.98	640.08	749.28	697.9	376.6	340.2	287.84	304.08	487.9	418.13	207.10	0.50
	41	ug/L	34.48	360.92	130.2	625.38	358.12	394.8	485.52	315.28	282.8	534.8	346.22	404.04	626.5	637.28	575.96	341.46	297.5	278.46	386.82	390.34	162.53	0.42
	45	ug/L	18.83	494.34	NaN	1213.24	196.42	157.08	577.64	343.84	565.6	814.66	842.52	210.14	633.22	604.8	1184.4	329.84	310.66	438.48	913.78	547.19	341.44	0.62
	51	ug/L	23.41	353.08	111.86	910.42	220.08	259.7	741.72	333.34	562.66	542.64	703.78	281.82	561.12	568.82	685.58	467.32	293.3	344.82	423.78	441.54	228.12	0.52
	52	ug/L	27.01	406.56	87.64	NaN	128.38	122.36	518.28	240.24	517.44	547.26	456.12	143.5	695.52	599.62	442.26	411.88	328.3	443.24	150.36	348.11	200.22	0.58
	59	ug/L	26.12	751.38	248.78	NaN	262.08	396.2	611.94	210	493.22	764.12	450.52	1192.66	743.82	583.38	795.48	464.52	504.98	445.2	788.9	540.74	274.24	0.51
	60	ug/L	28.56	447.86	230.44	1019.62	292.32	307.72	550.2	387.1	480.9	597.52	759.92	287.14	552.02	555.8	561.82	385.84	329	360.36	493.5	454.09	213.07	0.47
	NaN			414.95	123.98	598.88	261.75	296.61	531.69	325.21	478.12	674.86	600.22	529.95	623.84	600.55	577.57	363.60	306.03	328.58	543.03			
	NaN			133.73	74.16	336.14	60.70	88.09	139.91	62.24	73.01	161.88	159.05	291.52	88.27	51.29	235.74	65.23	84.68	83.11	210.83			
	NaN			0.32	0.60	0.56	0.23	0.30	0.26	0.19	0.15	0.24	0.26	0.55	0.14	0.09	0.41	0.18	0.28	0.25	0.39			
Pools																								
	11	ug/L	NaN	NaN	NaN	2352.98	2399.6	1613.78	2343.04	37.1	424.48	1720.32	1450.26	273.84	748.44	1679.02	508.48	521.92	978.46	643.86	1434.58	1195.64	782.11	0.65
	13	ug/L	1195.46	NaN	2816.66	2770.04	2806.58	1259.72	2056.04	196.42	668.78	1526.7	1337	488.46	1079.4	1684.9	557.48	688.24	1097.88	724.5	1700.58	1369.71	812.05	0.59
	14	ug/L	1109.92	NaN	2524.9	2783.2	3243.24	1674.68	1442.56	197.96	743.4	1649.76	1700.72	164.08	959.28	1763.58	1076.18	1014.72	NaN	673.68	2107	1460.52	860.19	0.59
	15	ug/L	1112.72	1420.86	3993.36	3044.72	811.58	953.82	2024.4	156.52	724.36	1511.44	628.04	573.72	1309	1477.28	1077.02	1001.14	1551.48	700.84	1746.08	1358.86	901.22	0.66
	16	ug/L	1069.46	627.76	3250.38	2261.84	1901.2	1348.34	2210.18	179.2	811.58	1329.72	923.02	534.52	1161.44	1601.74	757.68	1017.1	1753.22	1141.84	1910.16	1357.39	733.13	0.54
	17	ug/L	1126.86	519.4	2712.5	3604.3	2576.14	1442.14	2277.24	196.28	NaN	1995.7	1022	593.04	789.88	1326.92	1102.08	1092.56	NaN	666.12	1915.76	1468.17	917.56	0.62
	34	ug/L	1213.94	558.6	3407.6	2303.84	2128.56	1276.24	2428.86	175.56	867.72	1406.3	1015.56	779.8	1288.98	1101.52	521.78	1160.6	NaN	1113.14	1628.62	1354.29	787.27	0.58
	123	ug/L	NaN	NaN	5568.36	1546.44	2775.22	2503.34	313.46	893.34	2121.7	1522.36	703.78	1560.44	1820.84	NaN	474.04	1347.78	865.48	1915.2		1728.79	1280.50	0.74
	MEAN			781.66	3117.57	3086.16	2176.67	1542.99	2160.71	181.56	733.38	1657.71	1199.87	513.91	1112.11	1556.98	800.10	871.29	1345.76	816.18	1794.75			
	SD			428.48	543.07	1098.85	763.68	546.07	334.63	75.25	157.86	278.48	359.68	206.22	276.20	242.69	279.07	268.52	318.08	203.85	209.94			
	RSD			0.55	0.17	0.36	0.35	0.35	0.35	0.15	0.41	0.22	0.17	0.30	0.40	0.25	0.16	0.35	0.31	0.24	0.25	0.12		
Wells																								
	W4258-03	ug/L	NaN	NaN	NaN	NaN	NaN	2032.38	2068.08	128.8	602.14	1807.4	1802.22	299.18	1266.02	1782.34	2534.98	1501.08	4573.38	787.78	1911.28	1649.79	1107.11	0.67
	W4158-02	ug/L	NaN	NaN	4129.58	1925	2389.38	3040.38	3821.58	140.98	1230.18	1653.68	1805.58	656.88	1054.06	2243.78	2588.18	1366.68	4623.78	903.98	1795.08	2080.52	1245.54	0.60
	4061-01	ug/L	NaN	NaN	NaN	1583.4	1404.2	1186.22	4424.56	160.44	770	2003.68	977.34	539.42	404.6	1274	1620.78	1276.1	1807.82	1260.14	1323	1375.98	955.61	0.69
	4161-01	ug/L	NaN	NaN	NaN	3124.1	1770.3	1464.96	2028.88	27.58	833.98	1558.2	1245.16	317.38	667.38	1586.2	2159.78	363.58	NaN	1050.84	1467.76	1311.07	809.10	0.62
	4161-02	ug/L	NaN	NaN	NaN	2386.3	1599.92	1562.4	2841.16	217.7	755.16	2257.92	1179.08	622.16	1444.24	2159.5	2595.18	1353.8	3924.06	1405.6	2269.68	1785.87	933.59	0.52
	MEAN					2254.70	1790.95	1857.27	3036.85	135.10	838.29	1856.18	1401.88	487.00	967.26	1809.16	2299.78	1172.25	3732.26	1081.67	1753.36			

Appendix A. (con't) Summary of **Dissolved Organic Phosphorous** (uM) results for all sampling locations and sampling dates within the July 2004 - August 2006 period. Data are grouped according to the distinct water body types found within the Kaloko-Honokohau National Historical park. NaN = Not a Number

			7/23/2004	10/1/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/2005	8/25/2005	9/20/2005	10/21/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006	MEAN	SD	RSD
Kaloko	J10	uM	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	0.34	0.44	0.27	0.32	0.28	0.67	0.7	0.43	0.18	0.42
	F17	uM	NaN	0.42	0	0.16	0.45	0.32	0.32	0.29	0.56	0.47	0.88	0.97	0.35	0.36	0.35	0.4	0.12	0	0.52	0.39	0.25	0.66
	G6	uM	NaN	0.68	0	0.02	0.43	0.23	0.23	0.25	0.47	0.08	0.94	0.24	0.27	0.28	0.3	0.38	0.19	0.68	0.57	0.35	0.25	0.71
	G18	uM	NaN	0.62	0	0.09	0.18	0.24	0.31	0.25	0.8	0.06	0.97	0.33	0.58	0.22	0.17	0.33	0.28	0.66	0.82	0.38	0.29	0.75
	M6	uM	NaN	0.56	0	0.07	0.17	0.05	0.31	0.24	0.42	0.04	1.06	0	0.24	0.31	0.39	0.36	0.17	0.5	0.59	0.30	0.27	0.87
	O6	uM	NaN	0.66	0	0.23	0.08	0.00	0.25	0.34	0.44	0.01	1.18	0.24	0.31	0.96	0.3	0.42	0.26	0.42	1.09	0.40	0.36	0.89
	Q3	uM	NaN	0.2	0.04	0.04	0.12	0.02	0.1	0.26	0.51	0	1.13	0.08	0.23	0.15	0.13	0.35	0.21	0.13	0.21	0.22	0.26	1.20
	MEAN			0.52	0.01	0.10	0.24	0.14	0.25	0.27	0.53	0.11	1.03	0.31	0.33	0.38	0.27	0.37	0.22	0.44	0.64			
	SD			0.18	0.02	0.08	0.16	0.14	0.08	0.04	0.14	0.18	0.12	0.34	0.13	0.29	0.10	0.03	0.06	0.27	0.27			
RSD			0.35	2.45	0.78	0.67	0.95	0.33	0.14	0.26	1.63	0.11	1.11	0.40	0.77	0.37	0.09	0.28	0.63	0.42				
Aimakapa	21	uM	0.49	0.71	0	0.66	0.82	0.74	0.85	1.16	1.35	1.49	2.01	1.97	1.39	0.85	0.87	0.61	0.68	NaN	0.74	0.97	0.51	0.53
	25	uM	0.37	0.87	0	0.64	0.64	0.95	0.9	1.19	1.28	1.43	1.93	1.69	1.24	0.88	0.64	0.62	0.78	0.74	1.13	0.94	0.46	0.48
	34	uM	NaN	0.68	0	0.74	0.71	1.02	0.95	1.06	1.13	1.52	1.91	1.53	1.28	0.93	0.62	0.62	0.64	0.61	1.23	0.95	0.44	0.46
	38	uM	1.14	0.07	0	0.52	0.73	1.03	0.78	1.28	1.27	1.67	2.33	1.64	1.46	0.99	0.71	0.73	0.72	0.71	1.01	0.99	0.56	0.56
	39	uM	0.73	0.16	0	0.56	0.87	0.81	0.8	1.3	1.07	1.73	2.11	2.19	1.38	0.9	0.83	0.65	0.71	0.98	1.1	0.99	0.56	0.57
	40	uM	0.65	0.75	0	0.53	0.65	0.95	0.98	1.18	1.36	1.83	1.75	1.52	1.2	0.9	0.99	0.64	0.65	1.01	1.07	0.98	0.44	0.45
	41	uM	1.09	0.42	0	0.83	1	1.12	0.907	1.18	1.11	0.71	2.01	0.9	0.99	0.92	1.35	0.55	0.53	0.73	0.97	0.91	0.41	0.45
	45	uM	0.72	0.55	0	0.16	0.56	0.59	0.63	1.06	1.51	0	1.08	0.18	0.56	0.98	0.66	0.51	0.36	0.63	0.74	0.60	0.38	0.63
	51	uM	0.54	0.24	0	0.05	0.7	0.94	0.89	1.23	1.35	0.33	1.16	0.32	1.13	0.84	0.61	0.55	0.75	0.45	0.83	0.68	0.39	0.58
	52	uM	0.75	0.49	0	n.d.	0.5	0.61	0.66	1	1.17	0.58	1.53	0.3	0.67	0.78	0.47	0.47	0.57	0.17	0.76	0.64	0.35	0.55
	59	uM	0.76	1.43	0	n.d.	0.84	0.82	0.76	1.2	1.33	0.15	1.05	0.31	0.3	1.08	0.79	0.49	0.65	0.23	1.07	0.74	0.42	0.57
	60	uM	0.75	0	0	0.06	0.67	0.75	0.72	1.06	1.32	0.03	1.24	0.2	0.22	0.9	0.75	0.48	0.73	0.12	0.56	0.56	0.42	0.76
	MEAN			0.53	0.00	0.48	0.72	0.86	0.82	1.16	1.27	0.96	1.68	1.06	0.99	0.91	0.77	0.58	0.65	0.58	0.93			
	SD			0.40	0.00	0.28	0.14	0.17	0.11	0.09	0.13	0.72	0.45	0.77	0.44	0.08	0.23	0.08	0.12	0.31	0.20			
	RSD			0.75	0.00	0.60	0.19	0.20	0.14	0.08	0.10	0.75	0.27	0.72	0.44	0.09	0.29	0.14	0.18	0.53	0.22			
Pools	11	uM	NaN	NaN	NaN	0.09	0	0.02	0	0.16	0.41	0	1.33	0.05	0.04	0.11	0.02	0	0.16	0.23	0.29	0.18	0.33	1.81
	13	uM	NaN	NaN	NaN	0	0.25	0.00	0	0.07	0.29	0	1.63	0	0	0	0	0	0.19	0.01	0.16	0.16	0.40	2.49
	14	uM	0.4	NaN	NaN	0	0	0.00	0	0.04	0.47	0	0.33	0.01	0	0	0	0	NaN	0.04	0.19	0.09	0.16	1.75
	15	uM	0.18	0.65	0.21	0.09	0	0.00	0	0.13	0.32	0	1.46	0	0	0	0	0	0.06	0	0.00	0.16	0.35	2.17
	16	uM	0.19	0.02	0.09	0.06	0.1	0.00	0	0	0.4	0	1.49	0	0	0	0	0.03	0.23	0	0.17	0.15	0.34	2.34
	17	uM	0.31	0.48	0.13	0.11	0.21	0.00	0	0.01	0	0	1.8	0	0.01	0	0	0.06	NaN	0	0.33	0.19	0.43	2.22
	34	uM	n.d.	0.5	0.15	0.07	0.02	0.00	0	0.08	0.53	0	1.47	0	0.12	0	0	0	NaN	0	0.24	0.19	0.37	1.98
	123	uM	n.d.	n.d.	N/A	0.06	0.49	0.00	0	0.17	0.48	0.03	0.67	0.01	0.12	0.14	0	0.4	0.17	0.22	0.17	0.20	0.21	1.06
	MEAN		0.27	0.41	0.15	0.06	0.13	0.00	0.00	0.08	0.36	0.00	1.27	0.01	0.04	0.03	0.00	0.06	0.16	0.06	0.19			
	SD		0.10	0.27	0.05	0.04	0.17	0.01	0.00	0.07	0.09	0.01	0.50	0.02	0.05	0.06	0.01	0.14	0.06	0.10	0.10			
	RSD		0.39	0.66	0.34	0.68	1.31	2.83	0.00	0.79	0.24	2.83	0.40	1.97	1.47	1.87	2.83	2.26	0.39	1.62	0.52			
Wells	W4258-03	uM	NaN	NaN	NaN	NaN	0	0	0.03	0.45	0.52	0.96	0	0.02	0	0	0	0.29	0.04	0.28	0.19	0.29	1.56	
	W4158-02	uM	NaN	NaN	4.12	0.05	0.01	0	0	0	0.46	0	0.49	0	0.09	0	0	0	0.09	0.04	0.00	0.31	0.99	3.15
	4061-01	uM	NaN	NaN	NaN	0.05	0.05	0	0	0.15	0.04	0	1.29	0	0.02	0	0.25	0	0.01	0.16	0.03	0.13	0.32	2.48
	4161-01	uM	NaN	NaN	NaN	0	0	0	0	0.03	0.18	0	1.39	0	0	0	0	0	0	0	0.47	0.13	0.36	2.76
	4161-02	uM	NaN	NaN	NaN	0	0.01	0	0	0	0.38	0.05	0.45	0	0	0	0	0	0	0	0.74	0.10	0.22	2.17
	MEAN				0.03	0.02	0.00	0.00	0.04	0.30	0.11	0.92	0.00	0.03	0.00	0.05	0.00	0.08	0.05	0.30				
	SD				0.00	0.02	0.00	0.00	0.06	0.18	0.23	0.44	0.00	0.04	0.00	0.11	0.00	0.12	0.07	0.31				
RSD				0.00	1.27	0.00	0.00	1.48	0.61	2.00	0.48	0.00	1.43	0.00	2.24	0.00	1.59	1.37	1.02					

Appendix A. (con't) Summary of **Dissolved Organic Phosphorous** (ug/L) results for all sampling locations and sampling dates within the July 2004 - August 2006 period. Data are grouped according to the distinct water body types found within the Kaloko-Honokohau National Historical park. NaN = Not a Number

			7/23/2004	10/1/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/2005	8/25/2005	9/20/2005	10/21/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006	MEAN	SD	RSD
Kaloko	J10		NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	10.54	13.64	8.37	9.92	8.68	20.77	21.7	13.37	5.64	0.42
	F17	ug/L	NaN	13.02	0	4.96	13.95	9.92	9.92	8.99	17.36	14.57	27.28	30.07	10.85	11.16	10.85	12.4	3.72	NaN	16.12	12.66	7.47	0.59
	G6	ug/L	NaN	21.08	0	0.62	13.33	7.13	7.13	7.75	14.57	2.48	29.14	7.44	8.37	8.68	9.3	11.78	5.89	21.08	17.67	10.75	7.63	0.71
	G18	ug/L	NaN	19.22	0	2.79	5.58	7.44	9.61	7.75	24.8	1.86	30.07	10.23	17.98	6.82	5.27	10.23	8.68	20.46	25.42	11.90	8.87	0.75
	M6	ug/L	NaN	17.36	0	2.17	5.27	1.55	9.61	7.44	13.02	1.24	32.86	NaN	7.44	9.61	12.09	11.16	5.27	15.5	18.29	9.99	8.13	0.81
	O6	ug/L	NaN	20.46	0	7.13	2.48	0	7.75	10.54	13.64	0.31	36.58	7.44	9.61	29.76	9.3	13.02	8.06	13.02	33.79	12.38	11.05	0.89
	Q3	ug/L	NaN	6.2	1.24	1.24	3.72	0.62	3.1	8.06	15.81	0	35.03	2.48	7.13	4.65	4.03	10.85	6.51	4.03	6.51	6.73	8.06	1.20
	MEAN			16.22	0.21	3.15	7.39	4.44	7.85	8.42	16.53	3.41	31.83	11.53	10.23	11.78	8.47	11.57	6.69	15.81	19.93			
	SD			5.70	0.51	2.46	4.97	4.22	2.59	1.17	4.34	5.55	3.60	10.73	4.04	9.09	3.17	1.03	1.88	6.64	8.44			
RSD			0.35	2.45	0.78	0.67	0.95	0.33	0.14	0.26	1.63	0.11	0.93	0.40	0.77	0.37	0.09	0.28	0.42	0.42				
Aimakapa	21	ug/L	15.19	22.01	0	20.46	25.42	22.94	26.35	35.96	41.85	46.19	62.31	61.07	43.09	26.35	26.97	18.91	21.08	NaN	22.94	29.95	15.81	0.53
	25	ug/L	11.47	26.97	0	19.84	19.84	29.45	27.9	36.89	39.68	44.33	59.83	52.39	38.44	27.28	19.84	19.22	24.18	22.94	35.03	29.24	14.14	0.48
	34	ug/L	NaN	21.08	0	22.94	22.01	31.62	29.45	32.86	35.03	47.12	59.21	47.43	39.68	28.83	19.22	19.22	19.84	18.91	38.13	29.59	13.71	0.46
	38	ug/L	35.34	2.17	0	16.12	22.63	31.93	24.18	39.68	39.37	51.77	72.23	50.84	45.26	30.69	22.01	22.63	22.32	22.01	31.31	30.66	17.21	0.56
	39	ug/L	22.63	4.96	0	17.36	26.97	25.11	24.8	40.3	33.17	53.63	65.41	67.89	42.78	27.9	25.73	20.15	22.01	30.38	34.1	30.80	17.51	0.57
	40	ug/L	20.15	23.25	0	16.43	20.15	29.45	30.38	36.58	42.16	56.73	54.25	47.12	37.2	27.9	30.69	19.84	20.15	31.31	33.17	30.36	13.70	0.45
	41	ug/L	33.79	13.02	0	25.73	31	34.72	28.117	36.58	34.41	22.01	62.31	27.9	30.69	28.52	41.85	17.05	16.43	22.63	30.07	28.25	12.72	0.45
	45	ug/L	22.32	17.05	0	4.96	17.36	18.29	19.53	32.86	46.81	0	33.48	5.58	17.36	30.38	20.46	15.81	11.16	19.53	22.94	18.73	11.82	0.63
	51	ug/L	16.74	7.44	0	1.55	21.7	29.14	27.59	38.13	41.85	10.23	35.96	9.92	35.03	26.04	18.91	17.05	23.25	13.95	25.73	21.06	12.11	0.58
	52	ug/L	23.25	15.19	0	NaN	15.5	18.91	20.46	31	36.27	17.98	47.43	9.3	20.77	24.18	14.57	17.67	5.27	23.56	19.77	10.91	0.55	
	59	ug/L	23.56	44.33	0	NaN	26.04	25.42	23.56	37.2	41.23	4.65	32.55	9.61	9.3	33.48	24.49	15.19	20.15	7.13	33.17	22.84	12.98	0.57
	60	ug/L	23.25	0	0	1.86	20.77	23.25	22.32	32.86	40.92	0.93	38.44	6.2	6.82	27.9	23.25	14.88	22.63	3.72	17.36	17.23	13.04	0.76
	MEAN			16.46	0.00	14.73	22.45	26.69	25.39	35.91	39.40	29.63	51.95	32.94	30.54	28.29	24.00	17.88	20.07	17.98	28.96			
	SD			12.39	0.00	8.78	4.32	5.21	3.49	2.92	3.96	22.35	13.83	23.83	13.54	2.42	7.05	2.51	3.59	9.47	6.30			
	RSD			0.75	0.00	0.60	0.19	0.20	0.14	0.08	0.10	0.75	0.27	0.72	0.44	0.09	0.29	0.14	0.18	0.53	0.22			
	Pools	11	ug/L	NaN	NaN	NaN	2.79	0	0.62	0	4.96	12.71	0	41.23	1.55	1.24	3.41	0.62	0	4.96	7.13	8.99	5.64	10.19
13		ug/L	NaN	NaN	NaN	0	7.75	0	0	2.17	8.99	0	50.53	0	0	0	0	0	5.89	0.31	4.96	5.04	12.52	2.49
14		ug/L	12.4	NaN	NaN	0	0	0	0	1.24	14.57	0	10.23	0.31	0	0	0	0	NaN	1.24	5.89	2.87	5.01	1.75
15		ug/L	5.58	20.15	6.51	2.79	0	0	0	4.03	9.92	0	45.26	0	0	0	0	0	1.86	0	0	5.06	10.97	2.17
16		ug/L	5.89	0.62	2.79	1.86	3.1	0	0	0	12.4	0	46.19	0	0	0	0	0.93	7.13	0	5.27	4.54	10.62	2.34
17		ug/L	9.61	14.88	4.03	3.41	6.51	0	0	0.31	0	0	55.8	0	0.31	0	0	1.86	NaN	0	10.23	5.94	13.22	2.22
34		ug/L	NaN	15.5	4.65	2.17	0.62	0	0	2.48	16.43	0	45.57	0	3.72	0	0	0	NaN	0	7.44	5.80	11.50	1.98
123		ug/L	NaN	NaN	NaN	1.86	15.19	0	0	5.27	14.88	0.93	20.77	0.31	3.72	4.34	0	12.4	5.27	6.82	5.27	6.06	6.41	1.06
MEAN				8.37	12.79	4.50	1.86	4.15	0.08	0.00	2.56	11.24	0.12	39.45	0.27	1.12	0.97	0.08	1.90	5.02	1.94	6.01		
SD				3.25	8.45	1.55	1.26	5.42	0.22	0.00	2.03	2.70	0.33	15.64	0.54	1.66	1.81	0.22	4.30	1.95	3.14	3.10		
RSD			0.39	0.66	0.34	0.68	1.31	2.83	0.00	0.79	0.24	2.83	0.40	1.97	1.47	1.87	2.83	2.26	0.39	1.62	0.52			
Wells	W4258-03	ug/L	NaN	NaN	NaN	NaN	NaN	0	0	0.93	13.95	16.12	29.76	0	0.62	0	0	0	8.99	1.24	8.68	5.74	8.94	1.56
	W4158-02	ug/L	NaN	NaN	127.72	1.55	0.31	0	0	0	14.26	0	15.19	0	2.79	0	0	0	2.79	1.24	0	9.76	30.77	3.15
	4061-01	ug/L	NaN	NaN	NaN	1.55	1.55	0	0	4.65	1.24	0	39.99	0	0.62	0	7.75	0	0.31	4.96	0.93	3.97	9.87	2.48
	4161-01	ug/L	NaN	NaN	NaN	0	0	0	0	0.93	5.58	0	43.09	0	0	0	0	0	0	0	14.57	4.01	11.09	2.76
	4161-02	ug/L	NaN	NaN	NaN	0	0.31	0	0	0	11.78	1.55	13.95	0	0	0	0	0	0	0	22.94	3.16	6.84	2.17
	MEAN					0.78	0.54	0.00	0.00	1.30	9.36	3.53	28.40	0.00	0.81	0.00	1.55	0.00	2.42	1.49	9.42			
	SD					0.00	0.69	0.00	0.00	1.93	5.73	7.07	13.56	0.00	1.15	0.00	3.47	0.00	3.86	2.04	9.63			
	RSD					0.00	1.27	0.00	0.00	1.48	0.61	2.00	0.48	0.00	1.43	0.00	2.24	#DIV/0!	1.59	1.37	1.02			

Appendix A. (con't) Summary of **Phosphate** (uM) results for all sampling locations and sampling dates within the July 2004 - August 2006 period. Data are grouped according to the distinct water body types found within the Kaloko-Honokohau National Historical Park. NaN = Not a Number.

				7/23/2004	9/30/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/2005	8/25/2005	9/20/2005	10/21/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006	MEAN	SD	RSD
Kaloko	J10	uM	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	1.08	0.8	1.19	0.45	0.21	1.07	0.51	0.76	0.38	0.50
	F17	uM	NaN	2.08	1.45	0.86	0.77	0.66	0.85	0.2	0.36	1.23	1.37	1.95	1.06	0.45	1.58	0.42	0.26	1.75	0.45	0.99	0.60	0.61	
	G6	uM	NaN	0.56	0.93	0.76	0.14	0.73	0.64	0.24	0.46	0.49	1.61	0.56	1.04	0.37	0.71	0.28	0.44	0.91	0.65	0.64	0.34	0.54	
	G18	uM	NaN	2.68	1.87	1.87	2.06	1.01	1.03	0.18	0.61	1.33	2.44	1.27	1.98	1.75	2.66	0.4	0.3	2.21	1.91	1.53	0.80	0.52	
	M6	uM	NaN	0.73	1.99	1.86	1.08	2.29	0.62	0.23	0.78	2.4	3.23	3.01	1.92	1.86	1.3	0.51	0.26	1.1	0.97	1.45	0.91	0.63	
	O6	uM	NaN	2.02	2.81	1.84	2.58	2.93	0.63	0.2	0.63	2.09	2.84	2.59	0.96	1.97	0.84	0.35	0.83	2.41	2.47	1.72	0.95	0.55	
	Q3	uM	NaN	3.32	3.41	3.68	3.3	3.22	2.53	3	2.4	4.21	2.88	3.21	3.02	2.78	3.39	2.03	2.60	3.54	3.17	3.09	0.51	0.17	
	MEAN			1.90	2.08	1.81	1.66	1.81	1.05	0.68	0.87	1.96	2.40	2.10	1.66	1.53	1.75	0.67	0.70	1.86	1.45				
	SD			1.08	0.90	1.05	1.19	1.15	0.74	1.14	0.76	1.29	0.75	1.04	0.81	0.94	1.06	0.67	0.86	0.95	1.08				
RSD			0.57	0.43	0.58	0.72	0.64	0.71	1.69	0.87	0.66	0.31	0.49	0.48	0.61	0.61	1.01	1.23	0.51	0.74					
Aimakapa	21	uM	1.95	3.24	3.24	1.04	0.82	0.89	0.9	0.7	0.8	1.48	1.05	1.32	0.59	1.23	0.48	0.32	0.35	n.d.	0.5	1.16	0.86	0.74	
	25	uM	1.98	2.85	3.24	1.41	1.1	0.94	0.83	0.73	0.91	1.3	1.35	1.69	0.72	1.26	0.9	0.4	0.39	0.88	0.5	1.23	0.76	0.62	
	34	uM	2.2	2.75	3.2	1.48	1.18	1.19	0.92	0.76	0.82	1.34	1.61	1.71	1.09	1.16	1.04	0.39	0.51	0.69	0.93	1.31	0.73	0.56	
	38	uM	1.76	2.97	3.61	2.74	0.88	1.35	1.32	0.87	0.91	1.41	1.04	1.85	0.79	1.22	0.65	0.48	0.56	0.86	0.62	1.36	0.88	0.64	
	39	uM	1.86	3.09	3.34	2.42	0.98	0.96	1.13	0.69	0.86	1.4	1.28	1.69	0.63	1.46	0.96	0.49	0.46	1.11	0.58	1.34	0.83	0.62	
	40	uM	2.08	3.55	3.63	2.29	1.05	0.99	0.94	0.83	0.9	1.48	2.16	2.18	1.5	1.62	0.57	0.41	0.41	1.08	0.56	1.49	0.96	0.64	
	41	uM	1.64	3.08	3.33	2.29	1.15	1.03	0.89	0.81	0.96	1.83	2.06	1.16	2.33	1.4	0.66	0.26	0.41	1.08	1.58	1.47	0.84	0.57	
	45	uM	3.16	3.46	3.43	3.54	1.22	1.76	1.78	0.84	1.47	3.63	3.18	3.39	3.81	0.83	1.35	0.55	0.37	1.71	2.81	2.23	1.20	0.54	
	51	uM	3.22	3.03	3.24	3.79	1.15	1.1	0.91	0.59	0.87	2.88	2.78	3	1.08	1.18	1.28	0.48	0.53	1.41	0.95	1.76	1.12	0.64	
	52	uM	1.87	3.33	3.38	3.13	2.03	1.98	1.56	0.91	0.99	2.1	1.75	2.77	2.11	1.49	1.82	0.87	0.55	1.75	1.17	1.87	0.82	0.44	
	59	uM	4	3.9	3.41	1.04	1.21	1.28	0.76	1.12	3.99	3.54	3.63	3.66	1.14	1.73	1.18	0.59	4.49	3.31	2.44	1.41	0.58		
	60	uM	3.6	3.45	3.29	3.82	1.19	1.41	1.35	0.82	1.08	3.62	2.64	3.24	3.51	1.12	1.65	0.83	0.53	3.64	3.19	2.31	1.22	0.53	
	MEAN		2.44	3.23	3.36	2.54	1.15	1.23	1.15	0.78	0.97	2.21	2.04	2.30	1.82	1.26	1.09	0.56	0.47	1.70	1.39				
	SD		0.82	0.33	0.14	0.97	0.30	0.34	0.31	0.09	0.18	1.03	0.84	0.86	1.24	0.21	0.47	0.27	0.08	1.23	1.09				
	RSD		0.33	0.10	0.04	0.38	0.26	0.28	0.27	0.11	0.19	0.47	0.41	0.37	0.68	0.17	0.43	0.48	0.18	0.72	0.78				
Pools	11	uM	NaN	NaN	NaN	3.09	3.03	3.69	3.81	3.48	3.53	4.79	3.65	3.56	3.28	3.38	3.47	3.49	3.3	4.01	3.41	3.56	0.41	0.12	
	13		4.21	NaN	3.46	2.67	3.68	3.7	3.88	3.8	4	4.91	3.75	3.72	3.34	3.57	3.71	3.58	3.6	4.4	4.17	3.79	0.47	0.12	
	14		4.2	NaN	3.88	2.61	3.71	3.74	3.97	3.85	3.93	4.92	5.28	3.95	3.52	3.74	3.81	3.72	NaN	4.48	3.61	3.94	0.58	0.15	
	15	uM	4.33	3.89	3.87	2.77	3.83	3.91	4.11	4.06	4.13	4.78	3.94	3.9	3.84	3.13	4.01	4.15	4.09	4.85	4.56	4.01	0.48	0.12	
	16	uM	4.35	3.83	3.8	2.85	3.62	3.9	4.08	4.2	4.11	5.04	3.9	3.84	3.85	3.92	4.12	4.02	4.11	5.01	4.74	4.07	0.49	0.12	
	17	uM	4.39	3.78	3.91	2.31	3.35	3.89	4.14	4.06	NaN	5.06	3.71	4.05	3.82	4.11	4.02	4.01	NaN	3.91	4.86	3.96	0.59	0.15	
	34	uM	4.52	3.99	3.95	2.89	2.84	3.95	4.10	4.01	4.04	4.85	3.91	3.76	3.74	3.84	3.72	3.98	NaN	4.59	3.89	3.92	0.49	0.12	
	123	uM	NaN	NaN	NaN	2.58	2.8	3.1	3.30	3.55	3.65	3.15	2.8	3.53	3.91	3.64	4.76	3.55	3.71	3.75	4.69	3.53	0.60	0.17	
	MEAN		4.33	3.87	3.81	2.72	3.36	3.74	3.92	3.88	3.91	4.69	3.87	3.79	3.66	3.67	3.95	3.81	3.76	4.38	4.24				
	SD		0.12	0.09	0.18	0.24	0.42	0.28	0.28	0.26	0.23	0.63	0.68	0.18	0.25	0.31	0.39	0.26	0.34	0.45	0.55				
	RSD		0.03	0.02	0.05	0.09	0.12	0.07	0.07	0.07	0.06	0.13	0.18	0.05	0.07	0.08	0.10	0.07	0.09	0.10	0.13				
Wells	W4258-03	uM	NaN	NaN	NaN	NaN	NaN	4.28	4.59	4.34	4.57	4.71	4.2	4.33	4.26	4.39	4.32	4.46	4.33	5.15	4.67	4.47	0.25	0.06	
	W4158-02	uM	NaN	NaN	NaN	4.17	3.94	4.03	4.17	4.04	4.29	4.83	3.86	4	3.8	4.06	4.03	4.22	4.2	4.59	5.03	4.20	0.33	0.08	
	4061-01	uM	NaN	NaN	NaN	4.18	3.79	4.21	4.06	3.75	3.93	4.96	3.79	3.82	3.63	3.96	4.41	5.07	4.99	5.31	4.93	4.30	0.56	0.13	
	4161-01	uM	NaN	NaN	NaN	4.47	4.07	4.18	4.45	4.26	4.53	5.46	4.2	4.32	4.23	4.57	4.45	4.58	NaN	4.83	4.83	4.50	0.35	0.08	
	4161-02	uM	NaN	NaN	NaN	4.81	4.38	4.65	4.69	4.67	4.94	5.47	4.68	4.78	4.69	4.81	4.89	5.16	5.25	5.55	5.25	4.92	0.33	0.07	
	NaN					4.41	4.05	4.27	4.39	4.21	4.45	5.09	4.15	4.25	4.12	4.36	4.42	4.70	4.69	5.09	4.94				
	NaN					0.30	0.25	0.23	0.27	0.34	0.37	0.36	0.35	0.37	0.42	0.35	0.31	0.40	0.51	0.38	0.22				
NaN					0.07	0.06	0.05	0.06	0.08	0.08	0.07	0.09	0.09	0.10	0.08	0.07	0.09	0.11	0.07	0.04					

Appendix A. (con't) Summary of **Phosphate** (ug/L) results for all sampling locations and sampling dates within the July 2004 - August 2006 period. Data are grouped according to the distinct water body types found within the Kaloko-Honokohau National Historical Park. NaN = Not a Number.

			7/23/2004	9/30/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/2005	8/25/2005	9/20/2005	10/21/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006	MEAN	SD	RSD
Kaloko	J10	ug/L	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	33.48	24.8	36.89	13.95	6.51	33.17	15.81	23.52	11.64	0.50
	F17	ug/L	NaN	64.48	44.95	26.66	23.87	20.46	26.35	6.2	11.16	38.13	42.47	60.45	32.86	13.95	48.98	13.02	8.06	54.25	13.95	30.57	18.58	0.61
	G6	ug/L	NaN	17.36	28.83	23.56	4.34	22.63	19.84	7.44	14.26	15.19	49.91	17.36	32.24	11.47	22.01	8.68	13.64	28.21	20.15	19.84	10.65	0.54
	G18	ug/L	NaN	83.08	57.97	57.97	63.86	31.31	31.93	5.58	18.91	41.23	75.64	39.37	61.38	54.25	82.46	12.4	9.3	68.51	59.21	47.46	24.80	0.52
	M6	ug/L	NaN	22.63	61.69	57.66	33.48	70.99	19.22	7.13	24.18	74.4	100.13	93.31	59.52	57.66	40.3	15.81	8.06	34.1	30.07	45.02	28.15	0.63
	O6	ug/L	NaN	62.62	87.11	57.04	79.98	90.83	19.53	6.2	19.53	64.79	88.04	80.29	29.76	61.07	26.04	10.85	25.73	74.71	76.57	53.37	29.56	0.55
	Q3	ug/L	NaN	102.92	105.71	114.08	102.3	99.82	78.43	93	74.4	130.51	89.28	99.51	93.62	86.18	105.09	62.93	80.6	109.74	98.27	95.91	15.84	0.17
	MEAN			58.85	64.38	56.16	51.31	56.01	32.55	20.93	27.07	60.71	74.25	65.05	51.56	47.43	54.15	20.62	21.70	57.53	44.86			
	SD			33.49	27.98	32.54	37.03	35.62	23.03	35.32	23.62	40.09	23.20	32.17	25.01	29.16	32.98	20.86	26.79	29.31	33.40			
	RSD			0.57	0.43	0.58	0.72	0.64	0.71	1.69	0.87	0.66	0.31	0.49	0.48	0.61	0.61	1.01	1.23	0.51	0.74			
Aimakapa	21	ug/L	60.45	100.44	100.44	32.24	25.42	27.59	27.9	21.7	24.8	45.88	32.55	40.92	18.29	38.13	14.88	9.92	10.85	NaN	15.5	35.99	26.71	0.74
	25	ug/L	61.38	88.35	100.44	43.71	34.1	29.14	25.73	22.63	28.21	40.3	41.85	52.39	22.32	39.06	27.9	12.4	12.09	27.28	15.5	38.15	23.70	0.62
	34	ug/L	68.2	85.25	99.2	45.88	36.58	36.89	28.52	23.56	25.42	41.54	49.91	53.01	33.79	35.96	32.24	12.09	15.81	21.39	28.83	40.74	22.64	0.56
	38	ug/L	54.56	92.07	111.91	84.94	27.28	41.85	40.92	26.97	28.21	43.71	32.24	57.35	24.49	37.82	20.15	14.88	17.36	26.66	19.22	42.24	27.14	0.64
	39	ug/L	57.66	95.79	103.54	75.02	30.38	29.76	35.03	21.39	26.66	43.4	39.68	52.39	19.53	45.26	29.76	15.19	14.26	34.41	17.98	41.43	25.72	0.62
	40	ug/L	64.48	110.05	112.53	70.99	32.55	30.69	29.14	25.73	27.9	45.88	66.96	67.58	46.5	50.22	17.67	12.71	12.71	33.48	17.36	46.06	29.68	0.64
	41	ug/L	50.84	95.48	103.23	70.99	35.65	31.93	27.59	25.11	29.76	56.73	63.86	35.96	72.23	43.4	20.46	8.06	12.71	33.48	48.98	45.60	26.15	0.57
	45	ug/L	97.96	107.26	106.33	109.74	37.82	54.56	55.18	26.04	45.57	112.53	98.58	105.09	118.11	25.73	41.85	17.05	11.47	53.01	87.11	69.00	37.12	0.54
	51	ug/L	99.82	93.93	100.44	117.49	35.65	34.1	28.21	18.29	26.97	89.28	86.18	93	33.48	36.58	39.68	14.88	16.43	43.71	29.45	54.61	34.69	0.64
	52	ug/L	57.97	103.23	104.78	97.03	62.93	61.38	48.36	28.21	30.69	65.1	54.25	85.87	65.41	46.19	56.42	26.97	17.05	54.25	36.27	58.02	25.48	0.44
	59	ug/L	124	120.9	105.71	NaN	32.24	37.51	39.68	23.56	34.72	123.69	109.74	112.53	113.46	35.34	53.63	36.58	18.29	139.19	102.61	75.74	43.56	0.58
	60	ug/L	111.6	106.95	101.99	118.42	36.89	43.71	41.85	25.42	33.48	112.22	81.84	100.44	108.81	34.72	51.15	25.73	16.43	112.84	98.89	71.76	37.83	0.53
	MEAN		75.74	99.98	104.21	78.77	35.62	38.26	35.68	24.05	30.20	68.36	63.14	71.38	56.37	39.03	33.82	17.21	14.62	52.70	43.14			
	SD		25.27	10.18	4.37	30.02	9.43	10.57	9.52	2.76	5.69	32.01	26.06	26.64	38.46	6.47	14.59	8.34	2.57	38.16	33.64			
	RSD		0.33	0.10	0.04	0.38	0.26	0.28	0.27	0.11	0.19	0.47	0.41	0.37	0.68	0.17	0.43	0.48	0.18	0.72	0.78			
Pools	11	ug/L	NaN	NaN	NaN	95.79	93.93	114.39	118.11	107.88	109.43	148.49	113.15	110.36	101.68	104.78	107.57	108.19	102.3	124.31	105.71	110.38	12.72	0.12
	13	ug/L	130.51	NaN	107.26	82.77	114.08	114.7	120.28	117.8	124	152.21	116.25	115.32	103.54	110.67	115.01	110.98	111.6	136.4	129.27	117.37	14.51	0.12
	14	ug/L	130.2	NaN	120.28	80.91	115.01	115.94	123.07	119.35	121.83	152.52	163.68	122.45	109.12	115.94	118.11	115.32	NaN	138.88	111.91	122.03	17.98	0.15
	15	ug/L	134.23	120.59	119.97	85.87	118.73	121.21	127.41	125.86	128.03	148.18	122.14	120.9	119.04	97.03	124.31	128.65	126.79	150.35	141.36	124.24	14.96	0.12
	16	ug/L	134.85	118.73	117.8	88.35	112.22	120.9	126.48	130.2	127.41	156.24	120.9	119.04	119.35	121.52	127.72	124.62	127.41	155.31	146.94	126.10	15.29	0.12
	17	ug/L	136.09	117.18	121.21	71.61	103.85	120.59	128.34	125.86	NaN	156.86	115.01	125.55	118.42	127.41	124.62	124.31	NaN	121.21	150.66	122.87	18.18	0.15
	34	ug/L	140.12	123.69	122.45	89.59	88.04	122.45	127.1	124.31	125.24	150.35	121.21	116.56	115.94	119.04	115.32	123.38	NaN	142.29	120.59	121.54	15.17	0.12
	123	ug/L	NaN	NaN	NaN	79.98	86.8	96.1	102.3	110.05	113.15	97.65	86.8	109.43	121.21	112.84	147.56	110.05	115.01	116.25	145.39	109.41	18.71	0.17
	MEAN		134.33	120.05	118.16	84.36	104.08	115.79	121.64	120.16	121.30	145.31	119.89	117.45	113.54	113.65	122.53	118.19	116.62	135.63	131.48			
	SD		3.70	2.80	5.56	7.29	12.87	8.57	8.63	7.95	7.22	19.52	21.05	5.67	7.68	9.64	12.03	7.94	10.64	14.00	17.19			
	RSD		0.03	0.02	0.05	0.09	0.12	0.07	0.07	0.07	0.06	0.13	0.18	0.05	0.07	0.08	0.10	0.07	0.09	0.10	0.13			
Wells	W4258-03	ug/L	NaN	NaN	NaN	NaN	NaN	132.68	142.29	134.54	141.67	146.01	130.2	134.23	132.06	136.09	133.92	138.26	134.23	159.65	144.77	138.61	7.80	0.06
	W4158-02	ug/L	NaN	NaN	126.48	129.27	122.14	124.93	129.27	125.24	132.99	149.73	119.66	124	117.8	125.86	124.93	130.82	130.2	142.29	155.93	130.09	10.25	0.08
	4061-01	ug/L	NaN	NaN	NaN	129.58	117.49	130.51	125.86	116.25	121.83	153.76	117.49	118.42	112.53	122.76	136.71	157.17	154.69	164.61	152.83	133.28	17.48	0.13
	4161-01	ug/L	NaN	NaN	NaN	138.57	126.17	129.58	137.95	132.06	140.43	169.26	130.2	133.92	131.13	141.67	137.95	141.98	NaN	149.73	149.73	139.36	10.79	0.08
	4161-02	ug/L	NaN	NaN	NaN	149.11	135.78	144.15	145.39	144.77	153.14	169.57	145.08	148.18	145.39	149.11	151.59	159.96	162.75	172.05	162.75	152.42	10.16	0.07
	MEAN					136.63	125.40	132.37	136.15	130.57	138.01	157.67	128.53	131.75	127.78	135.10	137.02	145.64	145.47	157.67	153.20			
	SD					9.37	7.78	7.17	8.36	10.64	11.57	11.07	10.95	11.39	12.96	10.93	9.60	12.50	15.74	11.82	6.74			
	RSD					0.07	0.06	0.05	0.06	0.08	0.08	0.07	0.09	0.09	0.10	0.08	0.07	0.09	0.11	0.07	0.04			

Appendix A. (con't) Summary of **Silicate** (uM) results for all sampling locations and sampling dates within the July 2004 - August 2006 period. Data are grouped according to the distinct water body types found within the Kaloko-Honokohau National Historical Park. NaN = Not a number.

			7/23/2004	10/1/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/005	8/25/2005	9/20/2005	10/21/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006	MEAN	SD	RSD
Kaloko	J10		NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	211.0	227.4	406.4	333	491.2	441	345.4	350.77	104.93	0.30
	F17	uM	NaN	387	219	163.4	353.4	295	285.2	501.2	325.8	439.8	482.8	476.8	364.6	325.8	495.6	487.6	340.8	423	447.6	378.58	99.11	0.26
	G6	uM	NaN	61.14	126.8	93.2	107	203	56.2	378.2	216.8	307	406	318	217.6	179.4	364.6	334.4	363.4	294.8	382.2	244.99	119.70	0.49
	G18	uM	NaN	477.8	306	298.8	435.6	328.4	260.4	505	381.2	436.2	499	416.4	444	422.6	532	487.8	570.8	470.4	483.6	430.89	85.85	0.20
	M6	uM	NaN	54.42	277	236.2	468.2	422.6	151.4	406.8	85.4	335.8	449	504.6	362.2	354	363	423.8	343.2	285	434.4	330.95	128.82	0.39
	O6	uM	NaN	243	466.8	295.6	460.4	524.4	173.4	541.2	140.8	256.8	503	455.8	257	365	360.4	420.2	337.8	350.2	490.4	369.01	121.93	0.33
	Q3	uM	NaN	550.2	611.6	452.2	534.8	592.8	483.2	502.6	546.4	526	506.4	560.8	537.2	429	560.6	467	387.6	516.2	515.8	515.58	56.31	0.11
	MEAN			295.59	334.53	256.57	393.23	394.37	234.97	472.50	282.73	383.60	474.37	455.40	363.77	345.97	446.03	436.80	404.97	397.23	442.77			
	SD			210.84	176.00	124.39	151.98	146.92	146.64	64.37	170.00	100.43	39.60	82.93	117.71	90.93	93.63	58.35	90.75	88.87	61.25			
	RSD			0.71	0.53	0.48	0.39	0.37	0.62	0.14	0.60	0.26	0.08	0.18	0.32	0.26	0.21	0.13	0.22	0.22	0.14			
Aimakapa	21	uM	482.2	582.2	639.6	460.2	517.4	483.2	492	483.2	618.6	527	585.2	552.8	560	504.6	483.2	423.2	451	NaN	453.20	516.60	61.05	0.12
	25	uM	530.2	580	632.6	463	458.4	463	496.8	479.8	575.8	513.8	585.8	546.4	553.8	499.6	498.6	446.2	390	588.80	466.60	514.17	61.60	0.12
	34	uM	543.4	576.4	633.4	487.6	533	493.4	507.4	474.8	598	519.6	569.6	558.4	557.8	498.8	510.4	435.6	459.6	572.20	455.60	525.53	52.58	0.10
	38	uM	533	598.8	626.8	470.4	461.4	483	497.6	449.2	610.4	512.4	570.4	552.4	566.4	502.4	485	418	420.2	541.00	454.80	513.35	62.49	0.12
	39	uM	535.8	558.6	622.2	481.2	477	477.8	506	462.8	593.2	511.6	584.2	573	551.2	506.6	484.4	432.4	400.2	535.00	441.80	512.37	59.08	0.12
	40	uM	424.6	581.8	613	453.2	451.6	479.4	488.2	475	580.2	511.6	572	558.6	552.2	491.4	482.6	422	397.2	530.60	432.00	499.85	62.97	0.13
	41	uM	538.6	567.2	611.2	515	493.4	498.6	488	474	570.2	468.2	559.4	491	556.8	510.6	487.6	428	451.2	535.20	477.20	511.65	46.69	0.09
	45	uM	525.6	579.6	617.4	546.8	466.8	495.8	492.2	500.8	614.8	558.6	570.2	568.6	566.6	523.6	507.6	472	554.6	459.40	533.60	534.45	46.81	0.09
	51	uM	489	577.6	612	488.2	479	498.8	480	472.4	565.8	520.2	569	548.4	534.6	501.6	516	446.6	427.2	571.20	458.00	513.45	50.15	0.10
	52	uM	505	580.6	603.8	531.2	461	506.4	494.6	496.2	587.2	514.8	561.2	548.6	535.4	496.6	504	490	594.6	424.00	466.00	521.12	48.65	0.09
	59	uM	524.8	589.6	616.2	575.6	442.8	480.6	494	471.4	571.4	540	568.2	552.6	546.8	496.4	503.6	459.6	490.8	484.80	464.80	519.68	49.73	0.10
	60	uM	564.2	587	629.4	514	489.4	458.8	498.6	483.6	558.8	519	565.2	543.4	533.8	484.2	491.2	451.6	432.2	442.00	492.40	512.57	52.44	0.10
	MEAN		516.37	579.95	621.47	498.87	477.60	484.90	494.62	476.93	587.03	518.07	571.70	549.52	551.28	501.37	496.18	443.77	455.73	516.75	466.33			
	SD		36.91	10.20	10.91	38.08	26.89	14.46	7.59	13.72	20.05	20.98	8.89	20.40	11.58	9.86	11.92	21.88	63.11	55.84	26.28			
	RSD		0.07	0.02	0.02	0.08	0.06	0.03	0.02	0.03	0.03	0.04	0.02	0.04	0.02	0.02	0.02	0.05	0.14	0.11	0.06			
Pools	11	uM	NaN	NaN	NaN	486.4	473.6	578.4	544.2	556.6	624.4	542	553.6	551.2	542.2	528.4	560.4	555	500.4	595.00	497.20	543.06	39.62	0.07
	13	uM	583.2	NaN	583.6	NaN	556.6	591	549	571	610.4	522.4	550	538.4	532	534	570.2	561.8	485.2	532.40	523.80	552.65	30.77	0.06
	14	uM	588.2	NaN	590.4	NaN	565.4	590	547.2	569.6	607.4	559.6	567.6	557.8	535.2	533.2	598.6	565.8	NaN	573.80	503.40	565.83	26.98	0.05
	15	uM	599.6	594.4	612.6	467.6	584.8	607	561.40	560.4	607.6	555.8	581.4	581.8	575	550.2	593	580.4	480.4	635.80	562.40	573.24	41.29	0.07
	16	uM	598	598.2	617.8	481.8	585.4	615.4	573.20	579.8	614.2	569.4	574.2	573.4	568.8	551.4	604.8	576.8	527	579.40	558.00	576.16	32.49	0.06
	17	uM	603.8	602.8	602.6	498.8	587	611.2	555.60	568.4	NaN	577.4	575.8	583.6	572	556.6	593	585.4	NaN	604.60	559.80	578.73	27.13	0.05
	34	uM	597.2	583.2	530.7	487	586.8	619.8	563.80	575	609.4	576.2	568.2	560.8	560.2	535	576	567.8	NaN	561.40	528.60	565.95	31.35	0.06
	123	uM	NaN	NaN	NaN	510	555.8	571.8	583.80	571.6	632.4	643	589	571	580.6	556.2	571	543.6	472	574.80	593.00	569.98	40.61	0.07
	MEAN		595.00	594.65	589.62	488.60	561.93	598.08	559.78	569.05	615.11	568.23	569.98	564.75	558.25	543.13	583.38	567.08	493.00	582.15	540.78			
	SD		7.72	8.37	31.62	14.54	38.17	17.80	13.68	7.48	9.63	35.37	13.20	15.59	19.13	11.56	15.97	13.81	21.63	30.67	32.92			
	RSD		0.01	0.01	0.05	0.03	0.07	0.03	0.02	0.01	0.02	0.06	0.02	0.03	0.03	0.02	0.03	0.02	0.04	0.05	0.06			
Wells	Hua																							
	W4258-03	uM	NaN	NaN	NaN	NaN	NaN	920.4	799.60	836	888.2	870	844.8	823.8	814	821.6	854	850.4	738.4	808.8	786.6	832.61	45.00	0.05
	Hono																							
	W4158-02	uM	NaN	NaN	961	812.8	899.4	891.8	805.00	827	822.8	841.8	825.8	843	824.6	835.6	860	835.8	769.2	796.6	810	838.95	44.68	0.05
	4061-01	uM	NaN	NaN	NaN	535	526.2	580.4	555.20	540.8	558.4	499.4	549.4	511.4	492.8	551	514	558	580.2	479.4	542.8	535.90	29.83	0.06
	4161-01	uM	NaN	NaN	NaN	630	657	709.2	580.40	588.6	673.2	634.2	640.2	649	617.8	655.8	652.6	643.2	NaN	590.6	534.2	630.40	42.89	0.07
	4161-02	uM	NaN	NaN	NaN	622.2	668.2	685.2	595.2	575.6	564.4	638.4	634.8	621.4	628.6	621.8	681.8	646.6	505.6	600.2	594.6	617.79	45.80	0.07
	MEAN					650.00	687.70	757.4	667.08	673.6	701.4	696.76	699	689.72	675.56	697.16	712.48	706.8	648.35	655.12	653.64			
	SD					116.76	155.16	144.48	124.28	145.23	149.70	155.98	129.71	141.06	141.71	125.90	146.38	129.49	126.14	142.91	134.32			
	RSD					0.18	0.23	0.19	0.19	0.22	0.21	0.22	0.19	0.20	0.21	0.18	0.21	0.18	0.19	0.22	0.21			

Appendix A. (con't) Summary of **Silicate** (ug/L) results for all sampling locations and sampling dates within the July 2004 - August 2006 period. Data are grouped according to the distinct water body types found within the Kaloko-Honokohau National Historical Park. NaN = Not a number.

			7/23/2004	10/1/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/005	8/25/2005	9/20/2005	10/21/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006	MEAN	SD	RSD	
Kaloko	J10		NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	5908	6367.2	11379.2	9324	13753.6	12348	9671.2	9821.60	2937.94	0.30	
	F17	ug/L	NaN	10836	6132	4575.2	9895.2	8260	7985.6	14033.6	9122.4	12314.4	13518.4	13350.4	10208.8	9122.4	13876.8	13652.8	9542.4	11844	12532.8	10600.18	2775.03	0.26	
	G6	ug/L	NaN	1711.92	3550.4	2609.6	2996	5684	1573.6	10589.6	6070.4	8596	11368	8904	6092.8	5023.2	10208.8	9363.2	10175.2	8254.4	10701.6	6859.60	3351.60	0.49	
	G18	ug/L	NaN	13378.4	8568	8366.4	12196.8	9195.2	7291.2	14140	10673.6	12213.6	13972	11659.2	12432	11832.8	14896	13658.4	15982.4	13171.2	13540.8	12064.89	2403.81	0.20	
	M6	ug/L	NaN	1523.76	7756	6613.6	13109.6	11832.8	4239.2	11390.4	2391.2	9402.4	12572	14128.8	10141.6	9912	10164	11866.4	9609.6	7980	12163.2	9266.48	3607.00	0.39	
	O6	ug/L	NaN	6804	13070.4	8276.8	12891.2	14683.2	4855.2	15153.6	3942.4	7190.4	14084	12762.4	7196	10220	10091.2	11765.6	9458.4	9805.6	13731.2	10332.31	3413.91	0.33	
	Q3	ug/L	NaN	15405.6	17124.8	12661.6	14974.4	16598.4	13529.6	14072.8	15299.2	14728	14179.2	15702.4	15041.6	12012	15696.8	13076	10852.8	14453.6	14442.4	14436.18	1576.65	0.11	
	MEAN			8276.61	9366.93	7183.87	11010.53	11042.27	6579.07	13230.00	7916.53	10740.80	13282.27	12751.20	10185.47	9687.07	12488.93	12230.40	11339.20	11122.40	12397.60				
	SD			5903.66	4928.09	3482.89	4255.33	4113.77	4106.01	1802.24	4760.05	2812.11	1108.84	2322.07	3296.00	2546.16	2621.60	1633.82	2540.92	2488.35	1715.10				
RSD			0.71	0.53	0.48	0.39	0.37	0.62	0.14	0.60	0.26	0.08	0.18	0.32	0.26	0.21	0.13	0.22	0.22	0.14					
Aimakapa	21	ug/L	13501.6	16301.6	17908.8	12885.6	14487.2	13529.6	13776	13529.6	17320.8	14756	16385.6	15478.4	15680	14128.8	13529.6	11849.6	12628	NaN	12689.6	14464.80	1709.28	0.12	
	25	ug/L	14845.6	16240	17712.8	12964	12835.2	12964	13910.4	13434.4	16122.4	14386.4	16402.4	15299.2	15506.4	13988.8	13960.8	12493.6	10920	16486.4	13064.8	14396.72	1724.90	0.12	
	34	ug/L	15215.2	16139.2	17735.2	13652.8	14924	13815.2	14207.2	13294.4	16744	14548.8	15948.8	15635.2	15618.4	13966.4	14291.2	12196.8	12868.8	16021.6	12756.8	14714.74	1472.32	0.10	
	38	ug/L	14924	16766.4	17550.4	13171.2	12919.2	13524	13932.8	12577.6	17091.2	14347.2	15971.2	15467.2	15859.2	14067.2	13580	11704	11765.6	15148	12734.4	14373.73	1749.66	0.12	
	39	ug/L	15002.4	15640.8	17421.6	13473.6	13356	13378.4	14168	12958.4	16609.6	14324.8	16357.6	16044	15433.6	14184.8	13563.2	12107.2	11205.6	14980	12370.4	14346.32	1654.22	0.12	
	40	ug/L	11888.8	16290.4	17164	12689.6	12644.8	13423.2	13669.6	13300	16245.6	14324.8	16016	15640.8	15461.6	13759.2	13512.8	11816	11121.6	14856.8	12096	13995.87	1763.05	0.13	
	41	ug/L	15080.8	15881.6	17113.6	14420	13815.2	13960.8	13664	13272	15965.6	13109.6	15663.2	13748	15590.4	14296.8	13652.8	11984	12633.6	14985.6	13361.6	14326.27	1307.45	0.09	
	45	ug/L	14716.8	16228.8	17287.2	15310.4	13070.4	13882.4	13781.6	14022.4	17214.4	15640.8	15965.6	15920.8	15864.8	14660.8	14212.8	13216	15528.8	12863.2	14940.8	14964.67	1310.54	0.09	
	51	ug/L	13692	16172.8	17136	13669.6	13412	13966.4	13440	13227.2	15842.4	14565.6	15932	15355.2	14968.8	14044.8	14448	12504.8	11961.6	15993.6	12824	14376.67	1404.25	0.10	
	52	ug/L	14140	16256.8	16906.4	14873.6	12908	14179.2	13848.8	13893.6	16441.6	14414.4	15713.6	15360.8	14991.2	13904.8	14112	13720	16648.8	11872	13048	14591.24	1362.08	0.09	
	59	ug/L	14694.4	16508.8	17253.6	16116.8	12398.4	13456.8	13832	13199.2	15999.2	15120	15909.6	15472.8	15310.4	13899.2	14100.8	12868.8	13742.4	13574.4	13014.4	14551.16	1392.52	0.10	
	60	ug/L	15797.6	16436	17623.2	14392	13703.2	12846.4	13960.8	13540.8	15646.4	14532	15825.6	15215.2	14946.4	13557.6	13753.6	12644.8	12101.6	12376	13787.2	14351.92	1468.24	0.10	
	MEAN		14458.27	16238.60	17401.07	13968.27	13372.80	13577.20	13849.27	13354.13	16436.93	14505.87	16007.60	15386.47	15435.93	14038.27	13893.13	12425.47	12760.53	14468.87	13057.33				
	SD		1033.34	285.51	305.58	1066.23	752.96	404.94	212.61	384.08	561.30	587.51	248.88	571.28	324.29	276.11	333.72	612.63	1767.00	1563.59	735.78				
	RSD		0.07	0.02	0.02	0.08	0.06	0.03	0.02	0.03	0.03	0.04	0.02	0.04	0.02	0.02	0.02	0.05	0.14	0.11	0.06				
	Pools	11	ug/L	NaN	NaN	NaN	13619.2	13260.8	16195.2	15237.6	15584.8	17483.2	15176	15500.8	15433.6	15181.6	14795.2	15691.2	15540	14011.2	16660	13921.6	15205.75	1109.28	0.07
		13	ug/L	16329.6	NaN	16340.8	NaN	15584.8	16548	15372	15988	17091.2	14627.2	15400	15075.2	14896	14952	15965.6	15730.4	13585.6	14907.2	14666.4	15474.12	861.47	0.06
14		ug/L	16469.6	NaN	16531.2	NaN	15831.2	16520	15321.6	15948.8	17007.2	15668.8	15892.8	15618.4	14985.6	14929.6	16760.8	15842.4	NaN	16066.4	14095.2	15843.10	755.55	0.05	
15		ug/L	16788.8	16643.2	17152.8	13092.8	16374.4	16996	15719.2	15691.2	17012.8	15562.4	16279.2	16290.4	16100	15405.6	16604	16251.2	13451.2	17802.4	15747.2	16050.78	1155.99	0.07	
16		ug/L	16744	16749.6	17298.4	13490.4	16391.2	17231.2	16049.6	16234.4	17197.6	15943.2	16077.6	16055.2	15926.4	15439.2	16934.4	16150.4	14756	16223.2	15624	16132.42	909.62	0.06	
17		ug/L	16906.4	16878.4	16872.8	13966.4	16436	17113.6	15556.8	15915.2	NaN	16167.2	16122.4	16340.8	16016	15584.8	16604	16391.2	NaN	16928.8	15674.4	16204.42	759.61	0.05	
34		ug/L	16721.6	16329.6	14859.6	13636	16430.4	17354.4	15786.4	16100	17063.2	16133.6	15909.6	15702.4	15685.6	14980	16128	15898.4	NaN	15719.2	14800.8	15846.60	877.76	0.06	
123		ug/L	NaN	NaN	NaN	14280	15562.4	16010.4	16346.4	16004.8	17707.2	18004	16492	15988	16256.8	15573.6	15988	15220.8	13216	16094.4	16604	15959.30	1137.12	0.07	
MEAN			16660.00	16650.20	16509.27	13680.80	15733.90	16746.10	15673.70	15933.40	17223.20	15910.30	15959.30	15813.00	15631.00	15207.50	16334.50	15878.10	13804.00	16300.20	15141.70				
SD			216.13	234.37	885.36	407.04	1068.89	498.28	383.12	209.48	269.71	990.34	369.68	436.57	535.69	323.72	447.13	386.65	605.63	858.75	921.74				
RSD			0.01	0.01	0.05	0.03	0.07	0.03	0.02	0.01	0.02	0.06	0.02	0.03	0.03	0.02	0.03	0.02	0.04	0.05	0.06				
Wells		Hua	W4258-03	ug/L	NaN	NaN	NaN	NaN	25771.2	22388.8	23408	24869.6	24360	23654.4	23066.4	22792	23004.8	23912	23811.2	20675.2	22646.4	22024.8	23313.20	1259.97	0.05
		Hono	W4158-02	ug/L	NaN	NaN	26908	22758.4	25183.2	24970.4	22540	23156	23038.4	23570.4	23122.4	23604	23088.8	23396.8	24080	23402.4	21537.6	22304.8	22680	23490.68	1251.18
		4061-01	ug/L	NaN	NaN	NaN	14980	14733.6	16251.2	15545.6	15142.4	15635.2	13983.2	14319.2	13798.4	15428	14392	15624	16245.6	13423.2	15198.4	15005.20	835.28	0.06	
		4161-01	ug/L	NaN	NaN	NaN	17640	18396	19857.6	16251.2	16480.8	18849.6	17757.6	17925.6	18172	17298.4	18362.4	18272.8	18009.6	NaN	16536.8	14957.6	17651.20	1200.87	0.07
		4161-02	ug/L	NaN	NaN	NaN	17421.6	18709.6	19185.6	16665.6	16116.8	15803.2	17875.2	17774.4	17399.2	17600.8	17410.4	19090.4	18104.8	14156.8	16805.6	16648.8	17298.05	1282.44	0.07
	MEAN					18200.00	19255.60	21207.2	18678.24	18860.8	19639.2	19509.28	19572	19312.16	18915.68	19520.48	19949.44	19790.4	18153.8						

Appendix A. (con't) Summary of **Ammonium** (uM) results for all sampling locations and sampling dates within the July 2004 - August 2006 period. Data are grouped according to the distinct water body types found within the Kaloko-Honokohau National Historical Park. NaN = Not a Number.

			7/23/2004	10/1/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/2005	8/25/2005	9/20/2005	10/21/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006	MEAN	SD	RSD
Kaloko	J10		NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	1.91	2.55	2.34	3.72	2.84	5.82	2.67	3.12	1.31	0.42
	F17	uM	NaN	4.43	9.2	5.07	2.25	2.53	4.04	2.04	3.78	4.91	3.99	6.18	4.92	1.69	0.13	0.13	2.89	4.67	2.66	3.64	2.17	0.60
	G6	uM	NaN	6.36	11.89	11.16	3.72	1.11	6.69	1.46	0.9	5.88	15.65	5.69	2.38	1.27	1.5	2.41	2.35	4.39	2.01	4.82	4.25	0.88
	G18	uM	NaN	3.33	6.49	2.54	3.95	1.74	3.76	1.12	4.76	3.43	13.7	5.6	4.35	3.31	3.12	2.76	2.66	5.05	2.7	4.13	2.73	0.66
	M6	uM	NaN	5.32	5.56	3.64	2.73	2.1	0.37	1.78	0.13	8.6	18.09	4.1	3.2	2	3.68	4.25	2.72	7.00	2.95	4.35	4.03	0.93
	O6	uM	NaN	5.07	3.23	2.86	2.26	2.06	0.2	2.25	2.27	4.81	13.16	6.3	1.6	2.6	4.41	3.79	4.51	4.98	3.4	3.88	2.76	0.71
	Q3	uM	NaN	2.7	2.41	3.12	2.78	1.47	3.16	1.09	6.65	5.44	12.45	7.02	3.34	5.21	2.67	4.85	4.34	5.60	2.68	4.28	2.65	0.62
	MEAN	Mean		4.54	6.46	4.73	2.95	1.84	3.04	1.62	3.08	5.51	12.84	5.82	3.30	2.68	2.59	3.03	3.19	5.36	2.72			
	SD	s.d.		1.35	3.60	3.27	0.73	0.50	2.45	0.48	2.46	1.72	4.79	0.98	1.22	1.43	1.55	1.69	0.86	0.88	0.41			
	RSD	C.V.		0.30	0.56	0.69	0.25	0.27	0.81	0.30	0.80	0.31	0.37	0.17	0.37	0.53	0.60	0.56	0.27	0.16	0.15			
Aimakapa	21	uM	5.34	10.53	21.09	2.31	2.08	1.57	3.81	1.86	3.18	8.44	11.67	7.22	2.42	2.49	3.34	2.42	1.71	NaN	2.46	5.22	5.04	0.97
	25	uM	4.57	11.6	23.44	2.42	2.46	1.16	3.56	2	1.4	6.62	14.79	6.34	2.51	3	4.23	2.62	1.16	3.98	3.36	5.33	5.62	1.06
	34	uM	5.53	9.84	20.19	2.22	1.9	3.15	3.51	2.36	3.04	8.04	11.69	5.86	2.58	1.6	3.13	3.27	1.59	4.39	2.55	5.08	4.62	0.91
	38	uM	4.42	10.4	22.31	3.24	1.2	6.55	5.07	2.24	2.72	6.9	9.17	7.65	3.09	1.23	2.61	2.65	1.71	4.70	2.63	5.29	4.91	0.93
	39	uM	6.64	10.79	19.73	2.7	2.97	1.78	3.85	1.06	1.58	5.97	11.98	5.8	2.63	0.89	2.38	3.17	2.85	5.21	7.40	5.23	4.68	0.89
	40	uM	3.56	14.66	23.02	1.71	1.75	1.99	3.91	4.03	2.27	8.34	13.9	8.06	3.68	2.29	2.16	2.25	2.41	4.76	2.66	5.65	5.72	1.01
	41	uM	3.62	12.24	22.19	1.63	1.74	3.29	3.67	2.35	3.71	3.13	10.56	4.97	5.64	2.03	4.28	2.43	2.59	3.71	1.93	5.04	5.02	1.00
	45	uM	5.91	8.46	24.68	2.84	3	6.38	8.14	3.54	3.84	7.63	3.73	5.29	9.27	2.25	9.48	2.53	2.49	8.87	3.64	6.42	5.11	0.80
	51	uM	4.07	12.8	23.2	4.07	2.16	2.14	4.43	0.91	1.69	4.64	0.94	3.92	4.14	2.63	3.34	1.82	3.58	5.30	1.82	4.61	5.19	1.13
	52	uM	7.67	5.77	16.21	2.94	1.73	2.05	2.39	2.55	0.74	5.46	2.06	4.56	2.77	1.63	2.89	1.88	4.59	4.75	1.69	3.91	3.47	0.89
	59	uM	5.17	6.58	17.51	3.16	3.88	3.34	3.44	3.13	3.8	7.27	8.03	8.26	5.62	2.58	2.45	1.87	4.03	11.68	6.15	5.68	3.80	0.67
	60	uM	3.35	6.14	17.83	2.37	3.21	2.09	2.16	2.01	2.27	5.57	3.88	8.19	3.97	3.4	2.85	2.99	2.86	6.60	3.79	4.50	3.65	0.81
	MEAN		4.99	9.98	20.95	2.63	2.34	2.96	4.00	2.34	2.52	6.50	8.53	6.34	4.03	2.17	3.60	2.49	2.63	5.81	3.34			
	SD		1.32	2.78	2.68	0.68	0.78	1.77	1.52	0.91	1.03	1.61	4.75	1.51	2.00	0.73	1.97	0.49	1.04	2.41	1.76			
	RSD		0.26	0.28	0.13	0.26	0.33	0.60	0.38	0.39	0.41	0.25	0.56	0.24	0.50	0.34	0.55	0.20	0.39	0.42	0.53			
Pools	11	uM	NaN	NaN	NaN	1.93	1.4	2.33	2.54	2.65	3.08	4.82	11.01	7.14	2.54	2.97	2.63	3.77	4.41	3.71	4.53	3.84	2.36	0.61
	13	uM	2.06	n.d.	1.71	NaN	2.23	1.02	1.44	2.57	0.13	7.95	4.81	3.81	2.5	0.75	0.13	2.09	2.78	3.15	2.58	2.45	1.87	0.76
	14	uM	1.97	n.d.	1.15	NaN	1.44	2.18	2.06	1.26	3.1	4.76	0.13	3.38	2.48	0.73	0.13	0.82	NaN	4.84	2.1	2.03	1.43	0.70
	15	uM	2.97	0.71	2.26	0.82	0.23	2.87	3.60	2.32	2.66	5.29	9.19	4.62	2.2	2.18	0.47	1.89	4.28	4.28	3.26	2.95	2.08	0.70
	16	uM	1.46	2.06	1.43	1.84	2	1.09	3.73	1.3	0.13	5.92	4.12	5.67	1.94	1.79	0.13	1.6	3.37	2.59	1.74	2.31	1.60	0.69
	17	uM	3.91	NaN	1.55	0.95	2.29	1.89	2.44	2.18	NaN	3.45	1.8	4.54	1.48	2.12	0.13	6.81	NaN	2.52	2.04	2.51	1.57	0.63
	34	uM	1.54	NaN	0.7	0.74	1.56	2.54	0.61	0.86	2.22	3.9	9.26	5	2.03	2.32	0.13	2.6	NaN	2.89	1.45	2.37	2.17	0.91
	123	uM	NaN	NaN	NaN	6.46	8.44	10.37	12.09	1.91	9.69	7.3	8.86	5.78	6.36	6.99	13.17	14.17	4.13	7.18	3.70	7.91	3.40	0.43
	MEAN		2.32	1.39	1.47	2.12	2.45	3.04	3.56	1.88	3.00	5.42	6.15	4.99	2.69	2.48	2.12	4.22	3.79	3.90	2.68			
	SD		0.95	0.95	0.53	2.19	2.51	3.03	3.60	0.67	3.21	1.57	3.98	1.20	1.52	1.98	4.55	4.42	0.70	1.56	1.07			
	RSD		0.41	0.69	0.36	1.03	1.02	1.00	1.01	0.35	1.07	0.29	0.65	0.24	0.57	0.80	2.15	1.05	0.18	0.40	0.40			
Wells	W4258-03	uM	NaN	NaN	NaN	NaN	NaN	0.53	0.13	1.7	2.29	2	3.87	0.13	0.21	1.29	0.13	0.13	0.13	0.13	0.18	0.92	1.16	1.26
	W4158-02	uM	NaN	NaN	0.13	0.6	0.13	0.13	0.13	0.13	0.13	1.13	0.13	0.13	0.13	0.73	0.13	0.13	0.13	0.13	0.18	0.25	0.29	1.13
	4061-01	uM	NaN	NaN	NaN	1.5	1.9	1.57	4.96	1.34	2	7.03	1.54	8.57	1.8	0.9	0.13	1.25	2.43	2.92	0.92	2.55	2.32	0.91
	4161-01	uM	NaN	NaN	NaN	1.65	1.25	2.16	2.38	0.13	0.13	2.8	2.91	6.38	1.13	1.7	0.13	1.53	NaN	2.04	0.88	1.81	1.55	0.86
	4161-02	uM	NaN	NaN	NaN	0.75	0.42	1.4	0.66	0.65	1.66	3.52	0.13	3.81	1.44	2.05	0.13	0.75	1.41	2.95	0.34	1.38	1.17	0.85
	MEAN					1.13	0.93	1.16	1.65	0.79	1.24	3.30	1.72	3.80	0.94	1.33	0.13	0.76	1.03	1.63	0.50			
	SD					0.53	0.80	0.82	2.07	0.71	1.04	2.27	1.67	3.75	0.74	0.55	0.00	0.64	1.11	1.42	0.37			
	RSD					0.47	0.87	0.71	1.25	0.90	0.84	0.69	0.97	0.99	0.79	0.41	0.00	0.84	1.09	0.87	0.74			

Appendix A. (con't) Summary of **Ammonium** (ug/L) results for all sampling locations and sampling dates within the July 2004 - August 2006 period. Data are grouped according to the distinct water body types found within the Kaloko-Honokohau National Historical Park. NaN = Not a Number.

			7/23/2004	10/1/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/2005	8/25/2005	9/20/2005	10/21/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006	MEAN	SD	RSD
Kaloko	J10		NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	26.74	35.7	32.76	52.08	39.76	81.48	37.38	43.70	18.37	5.88
	F17	ug/L	NaN	62.02	128.8	70.98	31.5	35.42	56.56	28.56	52.92	68.74	55.86	86.52	68.88	23.66	1.82	1.82	40.46	65.38	37.24	50.95	30.43	8.36
	G6	ug/L	NaN	89.04	166.46	156.24	52.08	15.54	93.66	20.44	12.6	82.32	219.1	79.66	33.32	17.78	21	33.74	32.9	61.46	28.14	67.53	59.44	12.32
	G18	ug/L	NaN	46.62	90.86	35.56	55.3	24.36	52.64	15.68	66.64	48.02	191.8	78.4	60.9	46.34	43.68	38.64	37.24	70.7	37.8	57.84	38.26	9.26
	M6	ug/L	NaN	74.48	77.84	50.96	38.22	29.4	5.18	24.92	1.82	120.4	253.26	57.4	44.8	28	51.52	59.5	38.08	98	41.3	60.84	56.48	13.00
	O6	ug/L	NaN	70.98	45.22	40.04	31.64	28.84	2.8	31.5	31.78	67.34	184.24	88.2	22.4	36.4	61.74	53.06	63.14	69.72	47.6	54.26	38.63	9.97
	Q3	ug/L	NaN	37.8	33.74	43.68	38.92	20.58	44.24	15.26	93.1	76.16	174.3	98.28	46.76	72.94	37.38	67.9	60.76	78.4	37.52	59.87	37.06	8.66
	MEAN			63.49	90.49	66.24	41.28	25.69	42.51	22.73	43.14	77.16	179.76	81.41	46.18	37.52	36.19	42.44	44.62	75.02	38.14			
	SD			18.85	50.34	45.81	10.17	7.06	34.32	6.73	34.39	24.14	67.08	13.75	17.12	20.03	21.71	23.63	12.10	12.28	5.79			
	RSD			0.30	0.56	0.69	0.25	0.27	0.81	0.30	0.80	0.31	0.37	0.17	0.37	0.53	0.60	0.56	0.27	0.16	0.15			
Aimakapa	21	ug/L	74.76	147.42	295.26	32.34	29.12	21.98	53.34	26.04	44.52	118.16	163.38	101.08	33.88	34.86	46.76	33.88	23.94	NaN	34.44	73.06	70.55	0.97
	25	ug/L	63.98	162.4	328.16	33.88	34.44	16.24	49.84	28	19.6	92.68	207.06	88.76	35.14	42	59.22	36.68	16.24	55.72	47.04	74.58	78.70	1.06
	34	ug/L	77.42	137.76	282.66	31.08	26.6	44.1	49.14	33.04	42.56	112.56	163.66	82.04	36.12	22.4	43.82	45.78	22.26	61.46	35.7	71.06	64.73	0.91
	38	ug/L	61.88	145.6	312.34	45.36	16.8	91.7	70.98	31.36	38.08	96.6	128.38	107.1	43.26	17.22	36.54	37.1	23.94	65.8	36.82	74.05	68.74	0.93
	39	ug/L	92.96	151.06	276.22	37.8	41.58	24.92	53.9	14.84	22.12	83.58	167.72	81.2	36.82	12.46	33.32	44.38	39.9	72.94	103.6	73.23	65.50	0.89
	40	ug/L	49.84	205.24	322.28	23.94	24.5	27.86	54.74	56.42	31.78	116.76	194.6	112.84	51.52	32.06	30.24	31.5	33.74	66.64	37.24	79.14	80.07	1.01
	41	ug/L	50.68	171.36	310.66	22.82	24.36	46.06	51.38	32.9	51.94	43.82	147.84	69.58	78.96	28.42	59.92	34.02	36.26	51.94	27.02	70.52	70.22	1.00
	45	ug/L	82.74	118.44	345.52	39.76	42	89.32	113.96	49.56	53.76	106.82	52.22	74.06	129.78	31.5	132.72	35.42	34.86	124.18	50.96	89.87	71.50	0.80
	51	ug/L	56.98	179.2	324.8	56.98	30.24	29.96	62.02	12.74	23.66	64.96	13.16	54.88	57.96	36.82	46.76	25.48	50.12	74.2	25.48	64.55	72.63	1.13
	52	ug/L	107.38	80.78	226.94	41.16	24.22	28.7	33.46	35.7	10.36	76.44	28.84	63.84	38.78	22.82	40.46	26.32	64.26	66.5	23.66	54.77	48.53	0.89
	59	ug/L	72.38	92.12	245.14	44.24	54.32	46.76	48.16	43.82	53.2	101.78	112.42	115.64	78.68	36.12	34.3	26.18	56.42	163.52	86.1	79.54	53.14	0.67
	60	ug/L	46.9	85.96	249.62	33.18	44.94	29.26	30.24	28.14	31.78	77.98	54.32	114.66	55.58	47.6	39.9	41.86	40.04	92.4	53.06	63.02	51.08	0.81
	MEAN		69.83	139.78	293.30	36.88	32.76	41.41	55.93	32.71	35.28	91.01	119.47	88.81	56.37	30.36	50.33	34.88	36.83	81.39	46.76			
	SD		18.48	38.94	37.51	9.53	10.88	24.84	21.26	12.74	14.42	22.58	66.57	21.14	28.05	10.22	27.59	6.85	14.51	33.80	24.63			
	RSD		0.26	0.28	0.13	0.26	0.33	0.60	0.38	0.39	0.41	0.25	0.56	0.24	0.50	0.34	0.55	0.20	0.39	0.42	0.53			
Pools	11	ug/L	NaN	NaN	NaN	27.02	19.6	32.62	35.56	37.1	43.12	67.48	154.14	99.96	35.56	41.58	36.82	52.78	61.74	51.94	63.42	53.78	33.04	0.61
	13	ug/L	28.84	NaN	23.94	NaN	31.22	14.28	20.16	35.98	1.82	111.3	67.34	53.34	35	10.5	1.82	29.26	38.92	44.1	36.12	34.35	26.17	0.76
	14	ug/L	27.58	NaN	16.1	NaN	20.16	30.52	28.84	17.64	43.4	66.64	1.82	47.32	34.72	10.22	1.82	11.48	NaN	67.76	29.4	28.46	20.01	0.70
	15	ug/L	41.58	9.94	31.64	11.48	3.22	40.18	50.4	32.48	37.24	74.06	128.66	64.68	30.8	30.52	6.58	26.46	59.92	59.92	45.64	41.34	29.07	0.70
	16	ug/L	20.44	28.84	20.02	25.76	28	15.26	52.22	18.2	1.82	82.88	57.68	79.38	27.16	25.06	1.82	22.4	47.18	36.26	24.36	32.35	22.37	0.69
	17	ug/L	54.74	NaN	21.7	13.3	32.06	26.46	34.16	30.52	NaN	48.3	25.2	63.56	20.72	29.68	1.82	95.34	NaN	35.28	28.56	35.09	21.98	0.63
	34	ug/L	21.56	NaN	9.8	10.36	21.84	35.56	8.54	12.04	31.08	54.6	129.64	70	28.42	32.48	1.82	36.4	NaN	40.46	20.3	33.23	30.36	0.91
	123	ug/L	NaN	NaN	NaN	90.44	118.16	145.18	169.26	26.74	135.66	102.2	124.04	80.92	89.04	97.86	184.38	198.38	57.82	100.52	51.8	110.78	47.62	0.43
	MEAN		32.46	19.39	20.53	29.73	34.28	42.51	49.89	26.34	42.02	75.93	86.07	69.90	37.68	34.74	29.61	59.06	53.12	54.53	37.45			
	SD		13.26	13.36	7.37	30.62	35.10	42.48	50.35	9.34	44.99	21.94	55.74	16.76	21.35	27.68	63.69	61.92	9.74	21.83	14.92			
	RSD		0.41	0.69	0.36	1.03	1.02	1.00	1.01	0.35	1.07	0.29	0.65	0.24	0.57	0.80	2.15	1.05	0.18	0.40	0.40			
Wells	W4258-03	ug/L	NaN	NaN	NaN	NaN	NaN	7.42	1.82	23.8	32.06	28	54.18	1.82	2.94	18.06	1.82	1.82	1.82	1.82	2.52	12.85	16.22	1.26
	W4158-02	ug/L	NaN	NaN	1.82	8.4	1.82	1.82	1.82	1.82	1.82	15.82	1.82	1.82	1.82	10.22	1.82	1.82	1.82	1.82	2.52	3.57	4.02	1.13
	4061-01	ug/L	NaN	NaN	NaN	21	26.6	21.98	69.44	18.76	28	98.42	21.56	119.98	25.2	12.6	1.82	17.5	34.02	40.88	12.88	35.67	32.54	0.91
	4161-01	ug/L	NaN	NaN	NaN	23.1	17.5	30.24	33.32	1.82	1.82	39.2	40.74	89.32	15.82	23.8	1.82	21.42	NaN	28.56	12.32	25.39	21.75	0.86
	4161-02	ug/L	NaN	NaN	NaN	10.5	5.88	19.6	9.24	9.1	23.24	49.28	1.82	53.34	20.16	28.7	1.82	10.5	19.74	41.3	4.76	19.31	16.35	0.85
	MEAN					15.75	12.95	16.21	23.13	11.06	17.39	46.14	24.02	53.26	13.19	18.68	1.82	10.61	14.35	22.88	7.00			
	SD					7.37	11.27	11.47	28.94	9.95	14.55	31.78	23.35	52.55	10.42	7.67	0.00	8.93	15.60	19.89	5.20			
	RSD					0.47	0.87	0.71	1.25	0.90	0.84	0.69	0.97	0.99	0.79	0.41	0.00	0.84	1.09	0.87	0.74			

Appendix B. Summary of Hydrographic results for all stations and parameters, and sampling occasions during the July 2004 to August 2006. Hydrographic parameters include temperature, pH, salinity, dissolved oxygen (mg/L), dissolved oxygen (% saturation), and the tidal condition prevailing at the time of sample collections.

Appendix B (continued). Summary of Hydrological results for all stations and parameters, and sampling occasions during the July 2004 to August 2006 -- Temperature. NaN= Not a Number.

			7/23/2004	9/30/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/2005	8/25/2005	9/20/2005	10/20/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006	MEAN	SD	RSD
Kaloko	F17	°C	NaN	26.45	24.95	24.97	24.86	23.99	26.93	23.8	26.41	24.64	25.58	27	24.48	26.56	22.73	24.08	26.45	26.68	26.04	25.37	1.26	0.05
	G6	°C	NaN	27.68	25.34	23.92	25.67	22.27	28.3	25.93	28.44	24.66	25.43	27.25	23.9	27.07	25.97	27.52	28.44	28.27	26.7	26.26	1.79	0.07
	G18	°C	NaN	25.58	24.66	24.71	25.3	24.8	26.98	22.54	26.05	24.89	25.93	26.51	24.36	26.56	23.24	23.74	25.89	26.44	23.36	25.09	1.28	0.05
	M6	°C	NaN	28.5	24.03	25.52	25.38	21.56	25.51	25.88	29.19	28.53	28.39	26.88	25.22	27.47	25.42	26.64	25.17	27.28	25.36	26.22	1.87	0.07
	O6	°C	NaN	28.33	22.55	25.37	24.91	21.51	25.42	24.61	29.16	28.69	28.59	26.68	25.35	26.94	24.13	24.46	26.52	27.45	23.88	25.81	2.16	0.08
	Q3	°C	NaN	23.2	21.9	20.93	22.02	20.44	26.02	23.89	24.35	19.09	18.92	19.69	19.86	22.38	19.45	24.12	19.81	19.25	20.56	21.44	2.14	0.10
	Mean			26.62	23.91	24.24	24.69	22.43	26.53	24.44	27.27	25.08	25.47	25.67	23.86	26.16	23.49	25.09	25.38	25.90	24.32			
	SD			2.02	1.39	1.72	1.34	1.65	1.10	1.31	1.97	3.50	3.50	2.94	2.03	1.88	2.33	1.58	2.94	3.32	2.23			
	RSD			0.08	0.06	0.07	0.05	0.07	0.04	0.05	0.07	0.14	0.14	0.11	0.09	0.07	0.10	0.06	0.12	0.13	0.09			
Aimakapa	21	°C	NaN	26.29	24.58	22.43	23.21	22.58	25.95	24.98	27.28	27.36	27.84	25.91	22.97	23.21	24.55	26.43	26.35	26.8	29.66	25.47	2.04	0.08
	25	°C	NaN	26.89	24.08	22.52	22.92	21.99	26.2	25.34	27.73	27.42	27.5	26.12	23.64	23.24	24.76	26.9	26.84	26.45	29.35	25.55	2.09	0.08
	34	°C	NaN	26.89	24.07	22.55	23.11	21.85	26.02	25.31	27.5	27.47	27.71	26.36	23.89	23.13	24.62	26.13	26.68	26.82	29.21	25.52	2.06	0.08
	38	°C	NaN	26.68	24.6	22.47	23.1	22.24	25.39	26.05	27.05	27.39	27.74	25.9	23.99	22.78	24.3	26.66	25.87	26.79	29.74	25.49	2.05	0.08
	39	°C	NaN	26.63	24.52	22.49	23.07	22.04	25.48	25.16	27.05	27.14	28.01	26.11	23.21	22.92	24.52	26.1	26.13	26.81	29.5	25.38	2.06	0.08
	40	°C	NaN	26.38	23.94	22.47	23.04	21.88	25.7	25.1	27.03	27.16	26.93	26.01	23.45	22.81	24.79	26.08	25.85	26.63	29.26	25.25	1.97	0.08
	41	°C	NaN	26.58	23.95	22.33	23.06	21.87	25.83	25.11	27.18	27.55	27.23	25.79	23.7	22.77	24.62	26.09	25.82	26.68	29.08	25.29	2.01	0.08
	45	°C	31.13	26.45	25.02	21.49	23.58	22.4	24.95	25.31	26.94	25.56	24.56	23.82	22.78	23.8	24.68	25.51	NaN	26.06	27.41	25.08	2.17	0.09
	51	°C	32.31	26.92	24.22	22.78	23.31	22.05	26.08	25.5	27.4	28.08	26.99	27.09	24.16	23.24	24.42	25.93	26.47	26.03	29.34	25.91	2.48	0.10
	52	°C	30.68	26.53	24.83	23.11	23.61	22.19	24.95	25.02	27.22	28.15	27.1	26.99	24.83	23.75	24.46	25.8	26.26	25.6	28.92	25.79	2.10	0.08
	59	°C	NaN	25.39	24.27	21.8	23.44	22.4	25.56	25.44	27.46	25.37	24.76	NaN	24.1	23.04	24.29	25.4	26.59	25.71	27	24.82	1.56	0.06
	60	°C	31.79	26.58	24.49	22.74	23.46	22.52	25.44	25.58	27.49	27.46	26.5	25.72	25.9	23.16	24.4	25.86	26.52	25.75	28.19	25.77	2.18	0.08
	Mean		31.48	26.52	24.38	22.43	23.24	22.17	25.63	25.33	27.28	27.18	26.91	25.98	23.89	23.15	24.53	26.07	26.31	26.34	28.89			
	SD		0.72	0.41	0.35	0.43	0.23	0.26	0.41	0.30	0.24	0.86	1.14	0.85	0.85	0.34	0.17	0.43	0.35	0.48	0.89			
	RSD		0.02	0.02	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.03	0.04	0.03	0.04	0.01	0.01	0.02	0.01	0.02	0.03			
Pools	11	°C	NaN	NaN	NaN	18.95	22.19	20.38	20.29	21.89	22.38	21.38	21.97	21.47	19.92	20.43	21.55	21.36	20.06	21.68	27.14	21.44	1.80	0.08
	13	°C	NaN	21.12	19.91	19.96	20.11	20.13	20.65	20.62	21.81	21.61	21.42	21.36	20.62	20.21	20.09	20.39	20.37	21.54	22.09	20.78	0.70	0.03
	14	°C	NaN	22.39	19.1	19.93	20.04	19.89	20.96	20.94	22.74	21.12	20.46	21.92	20.34	20.07	20.43	20.89	NaN	21.53	24.72	21.03	1.34	0.06
	15	°C	NaN	21.9	18.69	19.99	19.89	19.07	20.72	20.36	22.13	21.95	20.6	21.07	19.88	20.06	20.58	21.38	20.92	21.56	22.84	20.76	1.09	0.05
	16	°C	NaN	20.53	19.46	19.52	19.45	19.43	19.71	19.84	20.1	20.91	20.19	20.87	20.03	19.57	19.7	19.72	20.71	20.19	21.19	20.06	0.56	0.03
	17	°C	NaN	21.92	19.6	19.54	20.63	19.21	20.63	21.7	NaN	20.36	20.18	20.41	19.92	20.1	20.12	NaN	NaN	20.37	20.64	20.36	0.73	0.04
	34	°C	NaN	20.17	19.39	19.59	19.50	19.24	19.6	19.69	21.67	20.56	20.22	20.74	19.93	19.81	19.61	19.76	NaN	20.49	21.67	20.10	0.73	0.04
	123	°C	NaN	NaN	NaN	21.14	23.23	23.89	20.61	23.59	22.37	25.39	23.33	24.25	20.94	21.57	21.84	25.91	21.69	21.66	21.22	22.66	1.62	0.07
	Mean		21.34	19.36	19.83	20.63	20.16	20.40	21.08	21.89	21.66	21.05	21.51	20.20	20.23	20.49	17.59	20.75	21.13	22.69				
	SD		0.87	0.42	0.63	1.36	1.58	0.49	0.49	1.29	0.87	1.60	1.13	1.20	0.40	0.60	0.82	9.43	0.62	0.65	2.20			
	RSD		0.04	0.02	0.03	0.07	0.08	0.02	0.06	0.04	0.04	0.07	0.05	0.06	0.02	0.03	0.04	0.54	0.03	0.03	0.10			
Wells	4061-01	°C	NaN	NaN	NaN	21.29	21.63	20.67	21.34	21.94	20.63	22.85	20.93	21.72	21.68	20.79	20.63	NaN	20.46	20.43	20.81	21.19	0.68	0.03
	4161-01	°C	NaN	NaN	NaN	20.31	21.89	21.6	21.75	21.94	20.4	21.07	20.67	21.14	20.38	19.88	20.56	26.66	20.32	20.1	20.31	21.19	1.60	0.08
	4161-02	°C	NaN	NaN	NaN	19.88	20.63	20.59	23.03	21.83	19.95	21.39	20.36	21.27	20.13	19.78	20.69	26.1	20.21	20.56	19.9	21.02	1.60	0.08
	Mean		20.49	21.38	20.95	22.04	21.90	20.33	21.77	21.90	20.33	21.38	20.73	20.15	20.63	20.33	20.33	20.33	20.36	20.34				
	SD		0.72	0.67	0.56	0.88	0.06	0.35	0.95	0.29	0.30	0.83	0.56	0.07	0.40	0.13	0.24	0.46						
	RSD		0.04	0.03	0.03	0.04	0.00	0.02	0.04	0.01	0.01	0.04	0.01	0.01	0.04	0.03	0.00	0.02	0.01	0.01	0.02			

Appendix B (continued). Summary of Hydrological results for all stations and parameters, and sampling occasions during the July 2004 to August 2006 -- Salinity. NaN= Not a Number.

			7/23/2004	9/30/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/19/2005	7/20/2005	8/25/2005	9/20/2005	10/20/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006	MEAN	SD	RSD
Kaloko	F17	ppt	NaN	25.49	26.01	28.58	22.28	22.95	25.37	16.31	22.32	18.76	19.74	21.57	22.13	24.43	15.49	15.12	17.85	21.91	15.68	21.22	4.02	0.19
	G6	ppt	NaN	32.85	29.53	30.92	30.34	26.4	33.03	21.96	31.64	22.83	26.52	28.17	26.66	29.75	25.9	24.96	26.63	30.17	18.6	27.60	3.89	0.14
	G18	ppt	NaN	24.19	25.43	28.64	24.67	22.48	25.58	14.43	21.89	18.77	20.44	20.8	21.36	24.43	17.58	14.78	17.63	21.56	15.3	21.11	4.06	0.19
	M6	ppt	NaN	33.78	27.61	32.23	29.53	18.48	29.11	22.24	32.26	27.57	29.3	27	26.8	29.77	25.17	21.22	21.45	28.82	16.07	26.58	4.90	0.18
	O6	ppt	NaN	33.7	16.49	31.64	28.79	14.67	29.1	18.9	32.19	27.86	28.58	27	27.09	29.53	21.84	17.53	23.52	28.75	14.51	25.09	6.23	0.25
	Q3	ppt	NaN	13.45	12.52	15.92	11.55	10.5	13.43	13.59	15.52	16.34	17.27	16.36	14.51	17.89	12.09	15.98	14.18	11.58	13.47	14.23	2.13	0.15
	MEAN			27.24	22.93	27.99	24.53	19.25	25.94	17.91	25.97	22.02	23.64	23.48	23.09	25.97	19.68	18.27	20.21	23.80	15.61			
	SD			7.98	6.80	6.10	7.08	5.89	6.74	3.73	7.07	4.88	5.11	4.65	4.90	4.72	5.53	4.03	4.52	7.05	1.73			
	RSD			0.29	0.30	0.22	0.29	0.31	0.26	0.21	0.27	0.22	0.22	0.20	0.21	0.18	0.28	0.22	0.22	0.30	0.11			
Aimakapa	21	ppt	NaN	13.37	12.56	11.81	12.28	12.07	12.77	11.85	12.72	12.79	12.73	13.16	13.45	13.32	13.08	12.71	12.78	13.84	13.02	12.80	0.55	0.04
	25	ppt	NaN	13.31	12.48	11.68	12.01	11.94	12.71	11.92	12.53	12.79	12.4	12.58	13.26	13.12	12.82	12.52	11.16	13.44	13.02	12.54	0.61	0.05
	34	ppt	NaN	13.38	12.42	11.68	11.95	11.68	12.77	11.85	12.99	12.73	12.53	12.65	13.2	13.12	12.88	12.58	12.72	13.57	12.88	12.64	0.55	0.04
	38	ppt	NaN	13.7	12.49	11.81	12.21	11.75	12.37	12.19	12.59	12.92	12.67	12.77	11.83	13.12	13.14	12.65	12.77	13.7	12.89	12.64	0.57	0.05
	39	ppt	NaN	13.5	12.36	11.75	12.08	11.87	12.5	12.11	12.59	12.92	12.73	12.77	13.52	13.05	13.14	12.64	12.77	13.64	12.89	12.71	0.55	0.04
	40	ppt	NaN	13.3	12.42	11.75	12.01	11.87	12.83	12.3	12.52	12.85	12.39	12.64	13.39	13.05	13.15	12.64	12.7	13.57	12.95	12.69	0.51	0.04
	41	ppt	NaN	13.5	12.42	11.55	12.01	11.8	12.84	12.04	12.46	12.79	12.46	12.57	13.33	13.18	13.01	12.64	12.7	13.5	12.88	12.65	0.56	0.04
	45	ppt	12.78	12.71	12.5	10.77	11.76	11.49	11.98	11.53	12.69	11.01	10.68	10.63	11.43	13.13	12.75	11.98	NaN	13.15	11.75	11.93	0.84	0.07
	51	ppt	13.59	13.51	12.49	11.49	12.02	11.81	12.9	11.92	12.46	12.67	12.2	12.46	13.27	13.12	12.75	12.58	12.71	13.3	12.56	12.62	0.58	0.05
	52	ppt	12.71	12.91	12.36	11.69	11.76	11.36	12.11	11.46	12.27	12.34	12.07	12.13	13.02	13.07	12.49	12.25	12.38	12.96	12.42	12.30	0.50	0.04
	59	ppt	NaN	12.24	12.36	10.78	12.08	11.81	12.5	11.92	12.4	11.59	11.26	NaN	12.09	13.25	12.75	12.37	12.72	13.42	12.39	12.23	0.66	0.05
	60	ppt	13.18	12.85	12.42	11.17	12.02	11.75	12.24	11.85	12.4	12.33	11.87	11.73	12.84	13.19	12.75	12.44	12.71	13.29	12.54	12.40	0.57	0.05
	MEAN			13.19	12.44	11.49	12.02	11.77	12.54	11.91	12.55	12.48	12.17	12.37	12.89	13.14	12.89	12.50	12.56	13.45	12.68			
	SD			0.42	0.06	0.38	0.15	0.19	0.31	0.24	0.19	0.60	0.63	0.68	0.70	0.08	0.21	0.21	0.48	0.25	0.37			
	RSD			0.03	0.01	0.03	0.01	0.02	0.02	0.02	0.01	0.05	0.05	0.06	0.05	0.01	0.02	0.02	0.04	0.02	0.03			
Pools	11	ppt	NaN	NaN	NaN	6.94	10.21	10.38	10.95	10.97	10.14	10.83	12.06	11.93	12.62	12.3	10.64	12.64	13.92	11.87	10.45	11.18	1.56	0.14
	13	ppt	11	11.02	13.4	9.42	9.68	9.93	10.83	10.25	9.82	11.41	11.99	11.6	12.89	12.17	11.33	12.56	13.08	11.86	10.59	11.31	1.19	0.11
	14	ppt	10.3	10.08	11.25	7.67	8.73	9.11	9.87	9.62	9.26	10.9	11.66	10.52	11.08	10.88	10.5	10.89	NaN	10.96	9.34	10.15	1.03	0.10
	15	ppt	9.6	9.19	9.66	6.62	8.22	8.41	9.24	8.73	8.94	9.32	9.87	9.56	10.18	9.86	9.3	9.82	10.32	9.94	9.26	9.27	0.85	0.09
	16	ppt	9	9.11	10.68	7.99	8.24	8.6	9.29	8.79	8.98	9.62	10.25	10	10.18	9.61	9.29	9.61	10	9.93	9.31	9.39	0.70	0.07
	17	ppt	8.5	8.6	9.54	4.8	7.7	8.03	8.61	8.22	NaN	8.86	9.42	9.36	9.42	8.98	8.79	NaN	NaN	9.24	15.68	8.98	2.11	0.24
	34	ppt	9.9	9.99	10.68	8.06	8.98	9.04	9.86	9.42	9.19	9.81	11.08	10.13	10.37	10.88	10.37	10.88	NaN	10.82	10.14	9.98	0.80	0.08
	123	ppt	n.d.	n.d.	n.d.	7.23	7.51	7.45	7.65	7.86	7.81	7.92	8	8.01	8.07	8.35	8.39	8.72	8.87	8.81	8.74	8.09	0.51	0.06
	MEAN			9.72	9.67	10.87	7.34	8.66	8.87	9.54	9.23	9.16	9.83	10.54	10.14	10.60	10.38	9.83	10.73	11.24	10.43	10.44		
	SD			0.90	0.87	1.40	1.34	0.94	0.96	1.10	1.04	0.74	1.17	1.42	1.25	1.59	1.43	1.03	1.48	2.15	1.14	2.21		
	RSD			0.09	0.09	0.13	0.18	0.11	0.11	0.12	0.11	0.08	0.12	0.14	0.12	0.15	0.14	0.10	0.14	0.19	0.11	0.21		
Wells	4061-01	ppt	NaN	NaN	NaN	10.32	10.01	10.63	10.64	11.23	NaN	12.01	11.92	12	12.06	11.92	10.95	NaN	11.08	11.78	12.18	11.34	0.73	0.06
	4161-01	ppt	NaN	NaN	NaN	6.36	6.28	6.32	6.38	6.57	NaN	6.7	6.66	6.6	6.87	6.76	6.95	12.65	6.96	6.92	7.08	7.07	1.56	0.22
	4161-02	ppt	NaN	NaN	NaN	5.5	4.87	4.88	4.95	5.07	NaN	5.05	5.08	5.06	5.18	5.27	5.38	12.64	5.31	5.3	5.38	5.66	1.94	0.34
	MEAN					7.39	7.05	7.28	7.32	7.62		7.92	7.89	7.89	8.04	7.98	7.76	12.65	7.78	8.00	8.21			
	SD					2.57	2.66	2.99	2.96	3.21		3.64	3.58	3.64	3.59	3.49	2.87	0.01	2.97	3.37	3.54			
	RSD					0.35	0.38	0.41	0.40	0.42		0.46	0.45	0.46	0.45	0.44	0.37	0.00	0.38	0.42	0.43			

Appendix B (continued). Summary of Hydrological results for all stations and parameters, and sampling occasions during the July 2004 to August 2006 -- pH. NaN= Not a Number.

			7/23/2004	9/30/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/19/2005	7/20/2005	8/25/2005	9/20/2005	10/20/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	8/1/2006	MEAN	SD	RSD
Kaloko	F17	units	NaN	8.13	8.03	8.16	8.13	7.95	8.04	8.42	8.07	8.19	8.15	8.41	8.1	8.35	7.77	8.22	8.35	8.47	8.17	0.18	0.02
	G6	units	NaN	8.37	8.16	8.18	8.27	7.9	8.08	8.48	7.84	8.19	8.08	8.11	8.03	8.32	8.2	8.14	8.13	8.46	8.17	0.17	0.02
	G18	units	NaN	8.19	8	8.12	8.22	7.93	7.94	8.16	7.96	8.16	8.17	8.29	8.07	8.33	7.92	8.18	8.19	8.11	8.11	0.13	0.02
	M6	units	NaN	8.37	8.09	8.2	8.13	7.71	8.13	8.37	7.94	8.28	8.16	8.23	7.95	8.12	7.89	7.82	7.94	8.42	8.10	0.20	0.03
	O6	units	NaN	8.43	7.26	8.17	NaN	NaN	8.19	8.33	7.9	8.2	8.16	8.06	8.04	8.2	8.15	8.31	7.95	8.18	8.10	0.27	0.03
	Q3	units	NaN	7.66	7.44	7.61	7.44	7.31	7.6	7.88	7.35	7.67	7.7	7.45	7.5	7.71	7.5	7.97	7.48	7.57	7.58	0.18	0.02
	Mean			8.19	7.83	8.07	8.04	7.76	8.00	8.27	7.84	8.12	8.07	8.09	7.95	8.17	7.91	8.11	8.01	8.20			
	SD			0.29	0.38	0.23	0.34	0.27	0.21	0.22	0.25	0.22	0.18	0.34	0.23	0.24	0.26	0.18	0.30	0.34			
	RSD			0.03	0.05	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.02	0.04	0.03	0.03	0.03	0.02	0.04	0.04			
Aimakapa	21	units	NaN	8.05	8.26	8.51	8.49	8.46	7.96	8.53	7.78	8.43	8.38	8.38	8.38	8.31	8.45	8.74	8.19	8.4	8.34	0.23	0.03
	25	units	NaN	8.29	8.26	8.42	8.43	8.48	8.07	8.56	7.83	8.41	8.25	8.26	8.35	8.32	8.37	8.64	8.15	8.36	8.32	0.19	0.02
	34	units	NaN	8.26	8.25	8.38	8.38	8.42	8.08	8.52	7.86	8.32	8.25	8.22	8.31	8.29	8.32	8.65	8.22	8.16	8.29	0.17	0.02
	38	units	NaN	8.03	8.08	8.01	8.41	7.79	7.67	8.46	8.05	8.41	8.22	8.05	7.65	8.21	8.4	8.59	7.94	8.39	8.14	0.28	0.03
	39	units	NaN	8.19	8.23	8.02	8.49	8.46	7.91	8.56	7.92	8.37	8.36	8.24	8.35	8.21	8.43	8.73	8.14	8.39	8.29	0.22	0.03
	40	units	NaN	8.11	8.17	8.11	8.4	8.47	7.98	8.5	7.89	8.35	7.62	8.04	8.25	8.22	8.51	8.68	8.16	8.34	8.22	0.26	0.03
	41	units	NaN	8.2	8.2	7.98	8.41	8.41	8.01	8.53	7.86	8.07	7.87	8.01	8.21	8.31	8.45	8.67	8.17	8.07	8.20	0.23	0.03
	45	units	8.34	7.75	8.38	7.24	8.46	8.3	7.65	8.42	7.72	7.19	7.14	7.22	7.31	8.37	8.32	8.34	NaN	7.36	7.85	0.53	0.07
	51	units	8.52	8.25	8.26	7.67	8.39	8.43	8.04	8.54	7.82	7.91	7.59	7.51	8.21	8.27	8.27	8.52	8.14	8.13	8.14	0.32	0.04
	52	units	8.43	7.96	8.15	7.71	8.23	8	7.8	8.39	7.83	8.09	7.86	7.68	8.23	8.19	8.13	8.41	8.1	7.97	8.06	0.23	0.03
	59	units	NaN	7.54	8.13	7.29	8.37	8.27	7.8	8.42	7.78	7.25	7.17	NaN	7.25	8.31	8.17	8.23	8.08	7.22	7.83	0.47	0.06
	60	units	8.38	7.7	8.18	7.41	8.39	8.24	7.82	8.42	7.81	7.41	7.32	7.28	7.42	8.26	8.15	8.38	8.15	7.38	7.89	0.43	0.05
	Mean			8.03	8.21	7.90	8.40	8.31	7.90	8.49	7.85	8.02	7.84	7.90	7.99	8.27	8.33	8.55	8.13	8.01			
	SD			0.25	0.08	0.44	0.07	0.22	0.15	0.06	0.08	0.47	0.46	0.41	0.45	0.06	0.13	0.17	0.07	0.44			
	RSD			0.03	0.01	0.06	0.01	0.03	0.02	0.01	0.01	0.06	0.06	0.05	0.06	0.01	0.02	0.02	0.01	0.06			
Pools	11	units	NaN	NaN	NaN	8.03	8.01	7.93	7.99	8.06	7.74	7.97	7.88	7.79	7.81	8.09	8.12	8.15	7.85	8.01	7.96	0.12	0.02
	13	units	NaN	7.99	7.99	7.88	7.95	7.84	7.91	7.93	7.61	7.96	7.93	7.88	7.83	8.08	7.9	7.98	7.72	7.82	7.89	0.11	0.01
	14	units	NaN	8.1	8.06	7.86	8.01	7.85	8.03	7.96	7.71	7.91	7.87	7.91	7.87	8.12	7.89	7.99	NaN	8	7.95	0.11	0.01
	15	units	NaN	8.04	8.01	7.9	8.03	8	8.1	8.03	7.71	8.09	7.9	7.85	7.8	8.04	7.97	7.97	7.88	7.96	7.96	0.11	0.01
	16	units	NaN	8.09	8.02	7.95	7.96	8.17	8.15	8.16	7.62	8.03	7.96	7.82	7.9	8.1	7.95	7.98	7.86	7.95	7.98	0.14	0.02
	17	units	NaN	8.15	8.05	7.95	8.09	7.98	8.06	8.12	NaN	8.03	7.99	7.89	7.93	8.17	8.03	NaN	NaN	7.95	8.03	0.08	0.01
	34	units	NaN	8.01	8.06	7.93	7.99	7.92	7.98	7.97	7.68	8	7.89	7.9	7.95	7.99	7.95	7.97	NaN	7.94	7.95	0.08	0.01
	123	units	NaN	NaN	NaN	7.18	7.73	8.73	7.83	7.96	7.6	8.76	8.32	7.85	7.85	8.14	7.68	8.51	9.11	7.74	8.07	0.52	0.06
	Mean			8.06	8.03	7.84	7.97	8.05	8.01	8.02	7.67	8.09	7.97	7.86	7.87	8.09	7.94	8.08	8.08	7.92			
	SD			0.06	0.03	0.27	0.11	0.29	0.10	0.08	0.06	0.27	0.15	0.04	0.06	0.06	0.13	0.20	0.58	0.09			
	RSD			0.01	0.00	0.03	0.01	0.04	0.01	0.01	0.01	0.03	0.02	0.01	0.01	0.01	0.02	0.02	0.07	0.01			
Wells	4061-01	units	NaN	NaN	NaN	7.94	8.62	7.98	7.82	7.9	7.73	8.01	7.89	7.89	8.04	7.83	8.31	NaN	8.77	7.78	8.04	0.31	0.04
	4161-01	units	NaN	NaN	NaN	7.21	7.06	7.28	7.41	7.22	7.06	7.25	7.17	7.16	7.44	7.12	8.2	8.19	7.42	7.23	7.36	0.36	0.05
	4161-02	units	NaN	NaN	NaN	7.86	7.76	7.82	7.89	7.93	7.64	7.95	7.94	7.9	8.05	7.81	8.05	8.13	8.17	7.76	7.91	0.15	0.02
	Mean					7.67	7.81	7.69	7.71	7.68	7.48	7.74	7.67	7.65	7.84	7.59	8.19	8.16	8.12	7.59			
	SD					0.40	0.78	0.37	0.26	0.40	0.36	0.42	0.43	0.42	0.35	0.40	0.13	0.04	0.68	0.31			
	RSD					0.05	0.10	0.05	0.03	0.05	0.05	0.05	0.06	0.06	0.04	0.05	0.02	0.01	0.08	0.04			

Appendix B. (continued). Summary of Hydrological results for all stations and parameters, and sampling occasions during the July 2004 to August 2006 -- Dissolved Oxygen (% Saturation). NaN = Not a Number.

			7/23/2004	9/30/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/2005	8/25/2005	9/20/2005	10/20/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006	MEAN	SD	RSD
Kaloko	F17	% SAT	NaN	103.6	89.2	82.8	113.5	100	87.7	123.5	129.4	101.4	114	151.2	108	131.6	78.6	114.6	200	125.8	167.4	117.91	30.84	0.26
	G6	% SAT	NaN	105.9	92.5	88.7	111.4	90.1	78.2	121.6	83.3	73.8	77.1	101.9	80.4	137.7	108.6	114	142.5	113.3	142	103.50	22.34	0.22
	G18	% SAT	NaN	102.6	91.6	80.2	114.2	102.1	84.7	102	124.4	105.9	118.4	138	110.9	124.7	101.7	106.6	175.9	124	150.9	114.38	23.40	0.20
	M6	% SAT	NaN	87	87.9	87.1	84.1	88.9	84.2	106.6	88.8	77.7	92.3	100.7	79.3	101.6	76.3	97.1	72.8	53.4	116.1	87.88	14.06	0.16
	O6	% SAT	NaN	98.3	93.2	88.8	91.9	85	87	106.8	83.1	72.2	97.3	93.4	86.7	110.2	82.6	119.9	82.8	46.8	126.7	91.82	17.83	0.19
	Q3	% SAT	NaN	79.7	90.6	65.3	NaN	86.2	98.5	114.8	91.5	68.1	64.3	116	74.2	68.7	94.5	107.6	103.7	91.1	98.2	89.00	16.79	0.19
	Mean			96.18	90.83	82.15	103.02	92.05	86.72	112.55	100.08	83.18	93.90	116.87	89.92	112.42	90.38	109.97	129.62	92.40	133.55			
	SD			10.50	2.01	8.94	14.02	7.24	6.68	8.79	21.08	16.21	20.87	23.07	15.67	25.26	13.23	7.99	51.68	35.08	24.98			
	RSD			0.11	0.02	0.11	0.14	0.08	0.08	0.08	0.21	0.19	0.22	0.20	0.17	0.22	0.15	0.07	0.40	0.38	0.19			
Aimakapa	21	% SAT	NaN	56.2	122	85.9	97.5	102.3	94	107.8	86.7	80.5	68	88.6	75.5	100.1	66.2	118.5	100.2	56.5	118.9	90.30	20.38	0.23
	25	% SAT	NaN	71.5	117.3	77	94.7	96.9	109.1	107.4	98.5	74.6	64.5	74.8	80.3	107.6	65.5	121.4	65.6	78	108.5	89.62	19.18	0.21
	34	% SAT	NaN	68.4	119.8	76	87.8	94.3	99.4	106.3	110.6	71.9	62.4	71.1	75.6	98.6	64.5	110.8	101	78.3	96.2	88.50	17.85	0.20
	38	% SAT	NaN	41.6	103.6	43.7	90.3	64	85	113.7	80.3	71.4	55.1	71.9	3.2	82.5	101.3	119.1	83.1	62.1	123.6	77.53	30.33	0.39
	39	% SAT	NaN	58.1	122.2	47.4	94	94.7	88.1	101.1	84.8	70	80.4	69.9	76	81.2	86.5	111.9	91.6	66.6	118.6	85.73	19.94	0.23
	40	% SAT	NaN	60.2	113.3	61.2	87.4	92.6	86.8	110.7	78.5	65.4	31.1	55.7	66.2	85.5	95.8	107.1	86.3	67.9	106.1	80.99	22.11	0.27
	41	% SAT	NaN	64.1	116.6	53.1	85.9	89.8	89.2	104	80	47.7	43.7	53.5	64.1	88.3	94.3	107.6	86.4	70.5	84.9	79.09	21.14	0.27
	45	% SAT	NaN	44.8	130	34.7	95.8	98.9	75.6	99.9	87.5	28.2	46.9	91	71.4	97.7	61.2	97.7	NaN	76.7	54.3	76.02	27.64	0.36
	51	% SAT	NaN	69	119.9	41.6	89.3	92.9	114	105	78	36.3	25.1	28.4	61.3	86.9	63.1	91.8	83.1	57.1	97.7	74.47	28.63	0.38
	52	% SAT	NaN	51.5	111	42.5	77.3	76.9	86.3	102.7	83.4	62.5	50.7	46.3	64.3	84.7	52.7	96.7	87.5	61.4	84.7	73.51	20.32	0.28
	59	% SAT	NaN	34.2	104.3	32.8	86.3	77.1	80.1	92.8	67.2	15.7	24	NaN	17.9	89.4	64.1	84.5	77.3	8	31.2	58.05	31.78	0.55
	60	% SAT	NaN	33.6	107.8	46.7	84.8	80.5	83.8	97.7	72.9	14	22.1	22.9	13	84.1	60	88	84.6	17.2	45.6	58.85	32.06	0.54
	Mean			54.43	115.65	53.55	89.26	88.41	90.95	104.09	84.03	53.18	47.83	61.28	55.73	90.55	72.93	104.59	86.06	58.36	89.19			
	SD			13.32	7.92	17.56	5.66	11.31	11.41	5.75	11.44	23.90	19.22	22.28	27.55	8.37	16.59	12.60	9.85	22.73	30.50			
	RSD			0.24	0.07	0.33	0.06	0.13	0.13	0.06	0.14	0.45	0.40	0.36	0.49	0.09	0.23	0.12	0.11	0.39	0.34			
Pools	11	% SAT	NaN	NaN	NaN	89.3	NaN	95.3	84	103	103.6	77.7	77.3	92.7	77.6	98	105	92.7	148.5	131.1	127.6	100.23	20.95	0.21
	13	% SAT	NaN	86.3	76.1	82.7	79.8	78.3	75	80.8	87.9	80.1	87.2	92.1	84.3	81	79.8	76	142.5	111.2	102.8	87.99	16.51	0.19
	14	% SAT	NaN	95.3	81.7	86.8	88.8	86	82.7	87.4	89.7	80.7	81.5	98	90.4	88.9	89.6	90.4	NaN	102.4	114	90.25	8.43	0.09
	15	% SAT	NaN	85.8	82.8	80.5	88.9	90.7	85.2	87.4	92.2	87.8	80.1	92.2	80.7	105.3	91.5	98.5	138	97.3	107.2	92.89	13.72	0.15
	16	% SAT	NaN	90.8	82.2	85.7	88.1	93.2	88.6	91.7	91.6	86.7	86.6	112	88.5	91.9	89.2	90.9	131.5	91.8	103.7	93.59	11.62	0.12
	17	% SAT	NaN	102.4	85.4	90.8	96.9	89	94.7	96.5	NaN	83.6	91.4	102	90.6	110.5	99.2	NaN	NaN	126.3	103.4	97.51	10.79	0.11
	34	% SAT	NaN	91.5	86.4	85.7	83.7	86.4	79.5	85.4	97.8	84.4	82.6	96.3	91	85.5	86.8	90.3	NaN	133.7	96.2	90.78	12.18	0.13
	123	% SAT	NaN	NaN	NaN	63.8	80.7	186.6	54.2	91.9	79.9	170.3	90.7	99.9	93.1	119.7	67.2	185.9	93.6	77.4	95.5	103.15	41.70	0.40
	Mean			92.02	82.43	83.16	86.70	100.69	80.49	90.51	91.81	93.91	84.68	98.15	87.03	97.60	88.54	103.53	130.82	108.90	106.30			
	SD			6.19	3.62	8.49	5.89	12.13	6.92	7.49	7.49	31.05	5.09	6.71	5.55	13.33	11.52	36.95	21.72	20.27	10.42			
	RSD			0.07	0.04	0.10	0.07	0.12	0.09	0.08	0.08	0.33	0.06	0.07	0.06	0.14	0.13	0.36	0.17	0.19	0.10			
Wells	4061-01	% SAT	NaN	NaN	NaN	70.3	75.3	75.1	68.2	77.7	66.6	60.1	77.4	74.8	58.5	78.9	91.8	80.4	89.5	82.3	81.6	75.53	9.22	0.12
	4161-01	% SAT	NaN	NaN	NaN	93.1	79.8	92.7	91.7	91	90.4	84	78	99.4	93.1	95.9	108.4	96	100	96.1	NaN	92.64	7.77	0.08
	4161-02	% SAT	NaN	NaN	NaN	83.6	81.5	90.6	108.1	93.1	94.5	87.4	87.9	99.5	93.1	100.4	146.5	98.3	98	95.5	NaN	97.20	15.28	0.16
	Mean					82.33	78.87	86.13	89.33	87.27	83.83	77.17	81.10	91.23	81.57	91.73	115.57	95.83	91.30					
	SD					11.45	3.20	9.61	20.06	8.35	15.06	14.88	5.90	14.23	19.98	11.34	28.05	9.74	5.58	7.80				
	RSD					0.14	0.04	0.11	0.22	0.10	0.18	0.19	0.07	0.16	0.24	0.12	0.24	0.11	0.06	0.09				

Appendix B. (continued). Summary of Hydrological results for all stations and parameters, and sampling occasions during the July 2004 to August 2006 -- Dissolved Oxygen (mg/L). NaN = Not a Number.

				7/23/2004	9/30/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/2005	8/25/2005	9/20/2005	10/20/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006	MEAN	SD	RSD
Kaloko	F17	mg/L	NaN	7.1	6.28	5.72	8.19	7.28	6	9.41	9.07	7.47	8.22	10.55	7.9	9.1	6.04	8.81	14.35	8.83	12.32	8.48	2.23	0.26	
	G6	mg/L	NaN	6.81	6.34	6.16	7.56	6.64	4.98	8.62	5.33	5.31	5.25	6.8	5.82	9.17	7.48	7.76	9.42	7.41	10.15	7.06	1.53	0.22	
	G18	mg/L	NaN	7.2	6.53	5.56	8.06	7.35	5.76	8.13	8.8	7.75	8.44	9.76	8.16	8.59	7.75	8.26	12.81	8.77	11.69	8.30	1.79	0.22	
	M6	mg/L	NaN	5.5	6.08	5.82	5.8	6.96	5.77	7.54	5.6	5.08	5.99	6.82	5.57	6.73	5.34	6.87	5.21	3.36	8.59	6.04	1.13	0.19	
	O6	mg/L	NaN	6.21	7.26	5.98	6.38	6.81	5.97	7.96	5.26	4.69	6.31	6.35	6.06	7.34	6.09	9.02	5.67	3.11	9.74	6.46	1.50	0.23	
	Q3	mg/L	NaN	6.19	7.31	5.24	9.41	7.24	7.34	8.87	6.93	5.65	5.34	9.73	6.2	5.28	8	8.21	8.85	7.82	8.19	7.32	1.44	0.20	
	MEAN			6.50	6.63	5.75	7.57	7.05	5.97	8.42	6.83	5.99	6.59	8.34	6.62	7.70	6.78	8.16	9.39	6.55	10.11				
	SD			0.65	0.53	0.32	1.31	0.29	0.77	0.68	1.74	1.29	1.41	1.87	1.12	1.54	1.10	0.77	3.69	2.63	1.64				
RSD			0.10	0.08	0.06	0.17	0.04	0.13	0.08	0.25	0.22	0.21	0.22	0.17	0.20	0.16	0.09	0.39	0.40	0.16					
Aimakapa	21	mg/L	NaN	4.15	9.37	6.92	7.7	8.21	7.04	8.26	6.34	5.85	4.91	6.75	5.74	7.86	5.06	8.84	7.45	4.15	8.34	6.83	1.58	0.23	
	25	mg/L	NaN	5.23	9.09	6.15	7.53	7.83	8.13	8.17	7.15	5.42	4.69	5.57	6.29	8.39	4.99	8.96	4.88	5.78	7.65	6.77	1.49	0.22	
	34	mg/L	NaN	5	9.29	6.06	6.96	7.65	7.43	8.1	8.03	5.28	4.52	5.29	5.89	7.76	4.95	8.33	7.47	5.76	6.85	6.70	1.39	0.21	
	38	mg/L	NaN	3.05	8.04	3.49	7.15	5.15	6.44	8.53	5.89	5.3	3.98	5.39	0.25	6.54	7.77	8.91	6.23	4.59	8.66	5.85	2.25	0.39	
	39	mg/L	NaN	4.26	9.4	3.78	7.44	7.64	6.67	7.7	6.17	5.11	5.78	5.2	5.99	6.41	6.6	8.41	6.84	4.9	8.35	6.48	1.51	0.23	
	40	mg/L	NaN	4.44	8.85	4.89	6.94	7.49	6.55	8.55	5.76	4.77	2.3	4.17	5.22	6.79	7.28	8.05	6.48	5.01	7.5	6.17	1.72	0.28	
	41	mg/L	NaN	4.71	9.06	4.26	6.82	7.27	6.71	7.94	5.86	3.49	3.22	4.02	4.97	6.99	7.2	8.11	6.49	5.2	5.99	6.02	1.67	0.28	
	45	mg/L	10.22	3.31	9.86	2.84	7.54	7.95	5.79	7.62	6.43	2.14	3.58	7.17	5.74	7.59	4.67	7.45	NaN	5.73	3.99	6.09	2.32	0.38	
	51	mg/L	10.56	5.04	9.27	3.33	7.05	7.5	8.51	8	5.69	2.61	1.84	2.09	4.75	6.83	4.84	6.92	6.2	4.27	6.94	5.91	2.42	0.41	
	52	mg/L	11.37	3.8	8.49	3.36	6.08	6.21	6.61	7.91	6.11	4.5	3.72	3.42	4.93	6.58	4.05	7.32	6.53	4.63	6.04	5.88	2.03	0.34	
	59	mg/L	NaN	2.58	8.08	2.67	6.8	6.18	6.05	7.05	4.91	1.18	1.85	NaN	1.4	7.04	4.92	6.52	5.73	NaN	2.3	4.70	2.33	0.49	
	60	mg/L	9.93	2.48	8.3	3.6	6.68	6.43	6.36	7.41	5.31	1.03	1.64	1.74	0.95	6.6	4.68	6.65	6.28	1.29	3.29	4.77	2.72	0.57	
	MEAN			10.52	4.00	8.93	4.28	7.06	7.13	6.86	7.94	6.14	3.89	3.50	4.62	4.34	7.12	5.58	7.87	6.42	4.66	6.33			
	SD			0.62	0.96	0.58	1.41	0.45	0.92	0.81	0.44	0.82	1.74	1.36	1.73	2.16	0.63	1.26	0.88	0.73	1.26	2.10			
	RSD			0.06	0.24	0.06	0.33	0.06	0.13	0.12	0.06	0.13	0.45	0.39	0.38	0.50	0.09	0.22	0.11	0.11	0.27	0.33			
Pools	11	mg/L	NaN	NaN	NaN	7.87	9.09	8.01	7.12	8.4	8.44	6.39	6.24	7.67	6.55	8.18	8.61	7.6	12.69	11.18	9.5	8.35	1.70	0.20	
	13	mg/L	NaN	11.02	6.35	7.04	6.79	6.63	6.27	6.78	7.23	6.53	7.11	7.56	6.99	6.78	6.71	6.39	12.46	9.45	8.38	7.58	1.72	0.23	
	14	mg/L	NaN	10.08	7.01	7.47	7.63	7.36	6.91	7.32	7.27	6.66	6.78	8.01	7.64	7.54	7.51	7.57	NaN	8.53	8.94	7.66	0.85	0.11	
	15	mg/L	NaN	9.19	7.24	6.96	7.67	7.92	7.2	7.45	7.59	7.2	6.72	7.76	6.92	9.1	7.71	8.21	11.52	8.06	8.69	7.95	1.14	0.14	
	16	mg/L	NaN	9.11	7.03	7.42	7.67	8.08	7.62	7.89	7.82	7.24	7.31	9.17	7.56	7.92	7.64	7.85	11.17	7.81	8.67	8.05	0.97	0.12	
	17	mg/L	NaN	8.6	7.34	8.03	8.27	7.77	8.03	8.04	NaN	7.09	7.75	8.59	7.8	9.45	8.45	NaN	NaN	10.33	8.77	8.29	0.81	0.10	
	34	mg/L	NaN	9.99	7.4	7.41	7.24	7.49	6.82	7.34	8.07	7.09	6.92	8.11	7.77	7.28	7.41	7.72	NaN	11.9	8.79	7.93	1.28	0.16	
	123	mg/L	NaN	NaN	NaN	5.38	6.56	14.87	4.63	7.41	6.58	13.23	7.28	7.91	7.91	9.99	5.58	14.35	7.77	6.47	8.01	8.37	3.14	0.38	
	MEAN			9.67	7.06	7.20	7.62	8.52	6.83	7.58	7.57	7.68	7.01	8.10	7.39	8.28	7.45	8.53	11.12	9.22	8.72				
	SD			0.87	0.38	0.82	0.81	2.61	1.03	0.51	0.61	2.27	0.46	0.54	0.50	1.13	0.96	2.63	1.98	1.84	0.43				
	RSD			0.090	0.054	0.114	0.106	0.306	0.151	0.067	0.081	0.295	0.065	0.066	0.068	0.136	0.129	0.308	0.178	0.200	0.049				
Wells	4061-01	mg/L	NaN	NaN	NaN	5.86	6.21	6.27	5.64	6.33	5.55	4.83	6.37	6.08	4.79	6.54	7.65	NaN	7.58	7.06	7	6.25	0.86	0.14	
	4161-01	mg/L	NaN	NaN	NaN	8.01	6.7	7.81	7.72	7.61	7.79	7.12	6.67	8.47	8.11	8.35	9.27	8.91	8.6	8.27	7.4	7.93	0.73	0.09	
	4161-02	mg/L	NaN	NaN	NaN	7.3	7.08	7.85	9.37	7.88	8.29	7.56	7.63	8.52	8.19	8.85	12.62	8.41	8.57	8.37	8.1	8.41	1.26	0.15	
	MEAN					7.06	6.66	7.31	7.58	7.27	7.21	6.50	6.89	7.69	7.03	7.91	9.85	8.66	8.25	7.90	7.50				
	SD					1.10	0.44	0.90	1.87	0.83	1.46	1.47	0.66	1.39	1.94	1.22	2.53	0.35	0.58	0.73	0.56				
	NaN					0.16	0.07	0.12	0.25	0.11	0.20	0.23	0.10	0.18	0.28	0.15	0.26	0.04	0.07	0.09	0.07				

Appendix B. (continued). Summary of Hydrological results for all stations and parameters, and sampling occasions during the July 2004 to August 2006 -- Tidal Height at time of Sampling (feet).

			7/23/2004	9/30/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/19/2005	7/20/2005	8/24/2005	9/20/2005	10/20/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2008
Kaloko	F17	ft.	NaN	0.79	0.62	1.7	0.1	0.35	-0.07	0.35	-0.2	1.8	1.92	1.81	2.08	0.32	0.80	0.17	-0.30	0.78	1.56
	G6	ft.	NaN	1.21	0.73	1.61	0.11	0.334	-0.09	0.41	-0.2	1.8	1.88	1.79	2.09	0.33	0.79	0.11	-0.29	0.78	1.56
	G18	ft.	NaN	0.74	0.55	1.67	0.1	0.346	-0.07	0.37	-0.2	1.8	1.91	1.82	2.08	0.32	0.80	0.16	-0.30	0.78	1.56
	M6	ft.	NaN	1.30	0.82	1.57	0.14	0.324	-0.05	0.45	-0.2	1.8	1.87	1.77	2.10	0.34	0.77	0.06	-0.29	0.77	1.56
	O6	ft.	NaN	1.33	0.31	1.54	0.13	0.32	-0.04	0.46	-0.2	1.8	1.86	1.76	2.09	0.34	0.77	0.21	-0.28	0.77	1.56
	Q3	ft.	NaN	0.61	0.24	1.45	0.1	0.308	-0.08	0.54	-0.2	1.8	1.81	1.69	2.05	0.31	0.76	0.25	-0.30	0.79	1.55
			MEAN	1.07	0.61	1.62	0.12	0.33	-0.06	0.41	-0.17	1.80	1.89	1.79	2.09	0.33	0.79	0.14	-0.29	0.78	1.56
			SD	0.29	0.20	0.07	0.02	0.01	0.02	0.05	0.02	0.00	0.03	0.02	0.01	0.01	0.02	0.06	0.01	0.01	0.00
			RSD	0.27	0.32	0.04	0.16	0.04	-0.30	0.12	-0.10	0.00	0.01	0.01	0.00	0.03	0.02	0.41	-0.03	0.01	0.00
Aimakapa	21	ft.	NaN	0.87	0.12	1.28	0.11	0.311	-0.01	0.5	-0.1	1.9	1.04	1.56	2.08	0.31	0.77	0.21	-0.20	0.75	1.50
	25	ft.	NaN	0.85	0.13	1.48	0.1	0.408	0	0.45	-0.1	1.9	1.19	1.66	2.09	0.31	0.77	0.20	-0.23	0.75	1.51
	34	ft.	NaN	0.83	0.13	1.46	0.1	0.405	0.01	0.46	-0.1	1.9	1.17	1.66	2.09	0.31	0.78	0.19	-0.24	0.75	1.52
	38	ft.	NaN	0.95	0.21	1.57	0.1	0.305	0.12	0.39	-0.2	1.9	1.24	1.70	2.10	0.33	0.82	0.08	-0.30	0.78	1.56
	39	ft.	NaN	0.92	0.2	1.54	0.1	0.427	0.1	0.41	-0.2	1.9	1.23	1.69	2.10	0.32	0.81	0.09	-0.30	0.78	1.55
	40	ft.	NaN	0.90	0.19	1.15	0.1	0.424	0.09	0.42	-0.2	1.9	1.22	1.68	2.10	0.32	0.81	0.10	-0.30	0.78	1.55
	41	ft.	NaN	0.89	0.17	1.5	0.1	0.417	0.08	0.42	-0.2	1.9	1.21	1.67	2.10	0.32	0.81	0.11	-0.30	0.78	1.55
	45	ft.	NaN	0.81	0.14	1.43	0.1	0.325	0.02	0.48	-0.1	1.9	1.15	1.64	2.10	0.31	0.78	0.17		0.76	1.52
	51	ft.	NaN	0.71	0.16	1.33	0.1	0.371	0.04	0.6	-0.2	1.9	1.10	1.61	2.10	0.31	0.79	0.13	-0.29	0.76	1.53
	52	ft.	NaN	0.68	0.15	1.37	0.1	0.337	0.03	0.62	-0.1	1.9	1.12	1.62	2.09	0.31	0.79	0.15	-0.26	0.76	1.53
	59	ft.	NaN	0.75	0.18	1.27	0.1	0.35	0.06	0.57	-0.2	1.9	1.06		2.10	0.31	0.80	0.12	-0.28	0.77	1.54
	60	ft.	NaN	0.77	0.17	1.3	0.1	0.359	0.05	0.59	-0.2	1.9	1.08	1.60	2.10	0.31	0.80	0.13	-0.28	0.77	1.54
			MEAN	0.83	0.16	1.39	0.10	0.37	0.05	0.49	-0.15	1.88	1.15	1.64	2.09	0.32	0.79	0.14	-0.27	0.77	1.53
			SD	0.09	0.03	0.13	0.00	0.05	0.04	0.08	0.05	0.00	0.07	0.04	0.00	0.01	0.02	0.04	0.03	0.01	0.02
			RSD	0.10	0.18	0.09	0.03	0.12	0.85	0.17	-0.33	0.00	0.06	0.03	0.00	0.02	0.02	0.31	-0.12	0.02	0.01
Pools	11	ft.	NaN	NaN	NaN	1.06	0.15	0.427	0.06	0.55	0.3	1.7	1.42	1.25	1.97	0.38	0.63	0.41	-0.17	0.67	1.45
	13	ft.	NaN	0.54	1.78	1.01	0.28	0.436	0.06	0.53	0.3	1.7	1.44	1.28	1.95	0.32	0.65	0.46	-0.20	0.69	1.46
	14	ft.	NaN	0.52	1.75	0.98	0.23	0.445	0.08	0.5	0.3	1.7	1.48	1.31	1.94	0.32	0.66	0.49		0.70	1.47
	15	ft.	NaN	0.50	1.61	0.77	0.21	0.467	0.11	0.44	0.2	1.5	1.57	1.39	1.90	0.35	0.68	0.66	-0.24	0.71	1.49
	16	ft.	NaN	0.47	1.67	0.87	0.17	0.482	0.17	0.38	0.1	1.6	1.65	1.46	1.87	0.33	0.70	0.59	-0.26	0.74	1.51
	17	ft.	NaN	0.48	1.64	0.81	0.19	0.474	0.14	0.42		1.5	1.55	1.43	1.83	0.34	0.69			0.73	1.50
	34	ft.	NaN	0.45	1.7	0.94	0.26	0.451	0.09	0.47	0.2	1.6	1.50	1.34	1.92	0.37	0.64	0.51		0.68	1.45
	123	ft.	NaN	NaN	NaN	0.51	0.45	0.158	-0.02	0.94	0.6	1.8	0.70	1.27	1.74	0.46	0.62	0.52	0.11	0.65	1.33
			MEAN	0.49	1.69	0.87	0.24	0.42	0.09	0.53	0.29	1.63	1.41	1.34	1.89	0.36	0.66	0.52	-0.15	0.69	1.46
			SD	0.03	0.06	0.18	0.09	0.11	0.06	0.18	0.14	0.10	0.30	0.08	0.08	0.05	0.03	0.08	0.15	0.03	0.06
			RSD	0.07	0.04	0.20	0.39	0.26	0.67	0.33	0.49	0.06	0.21	0.06	0.04	0.13	0.04	0.16	-0.98	0.05	0.04
Wells	4061-01	ft.	NaN	NaN	NaN	-0.02	1.02	0.169	0.02	1.31	2.2	1.7	0.64	1.18	1.64	0.51	0.57		0.29	0.58	1.26
	4161-01	ft.	NaN	NaN	NaN	-0.03	1.03	0.203	-0.04	1.26	1.8	1.6	0.54	1.01	1.91	0.59	0.50	0.08	0.80	0.54	1.11
	4161-02	ft.	NaN	NaN	NaN	-0.02	1.02	0.183	-0.08	1.21	1.5	1.7	0.54	1.08	1.98	0.55	0.46	0.09	0.55	0.50	1.17
			MEAN	-0.02	1.02	0.19	-0.03	1.26	1.85	1.68	0.57	1.09	1.84	0.55	0.51	0.09	0.55	0.09	0.55	0.54	1.18
			SD	0.01	0.01	0.02	0.05	0.05	0.34	0.06	0.05	0.08	0.18	0.04	0.06	0.00	0.25	0.04	0.07	0.04	0.07
			RSD	-0.25	0.01	0.09	-1.51	0.04	0.19	0.03	0.09	0.08	0.10	0.07	0.11	0.05	0.46	0.08	0.08	0.06	0.06

Appendix C. Summary of Quality Control Results for ammonium, nitrate + nitrite, phosphate, silicate, total dissolved organic nitrogen, total dissolved organic phosphate, and chlorophyll a.

Appendix C. Summary of Quality Control Results for all parameters during the January 2005 to August 2006. (RSD is given as ratio of s.d./mean). NaN= Not a Number.

Sampling Location	Sample Site ID	Date	NH4 (uM)	RSD	NO3 (uM)	RSD	SiO2 (uM)	RSD	PO4 (uM)	RSD	TDN (uM)	RSD	TDP (uM)	RSD	Chla (ug/L)	RSD
Kaloko	QC-F17	1/12/2005	6.11		7.18		158.2		0.94		NaN		NaN		2.68	
	QC-F17	1/12/2005	5.95		7.45		158		0.92		NaN		NaN		2.61	
	QC-F17	1/12/2005	5.65		7.92		157		0.93		NaN		NaN		2.53	
		MEAN	5.90		7.52		157.73		0.93						2.61	
		RSD	0.23	0.04	0.37	0.05	0.64	0.00	0.01	0.01					0.07	0.03
Kaloko	QC-G6	1/12/2005	11.26		6.01		89.2		0.63		NaN	NaN	NaN		1.64	
	QC-G6	1/12/2005	11.81		6.43		89.4		0.64		NaN	NaN	NaN		1.41	
	QC-G6	1/12/2005	12.3		6.88		90.8		0.62		NaN	NaN	NaN		1.41	
		MEAN	11.79		6.44		89.80		0.63						1.49	
		RSD	0.52	0.04	0.44	0.07	0.87	0.01	0.01	0.02					0.13	0.09
Aimakapa	QC-A41	1/12/2005	1.65		9.85		509		1.9		NaN	NaN	NaN		17.87	
	QC-A41	1/12/2005	2.16		14.14		485.2		2.36		NaN	NaN	NaN		14.89	
	QC-A41	1/12/2005	2.73		13.35		514.4		2.34		NaN	NaN	NaN		14.89	
		MEAN	2.18		12.45		502.87		2.20						15.88	
		RSD	0.54	0.25	2.28	0.18	15.54	0.03	0.26	0.12					1.72	0.11
Kaloko	QC-F17	2/23/2005	3.22		11.08		349.8		0.75		24.81		1.22		2.66	
	QC-F17	2/23/2005	3.54		11.38		345.4		0.73		25.2		1.2		2.66	
	QC-F17	2/23/2005	2.45		12.22		338.6		0.73		29.2		1.14		2.66	
		MEAN	3.07		11.56		344.60		0.74		26.40		1.19		2.66	
		RSD	0.56	0.18	0.59	0.05	5.64	0.02	0.01	0.02	2.43	0.09	0.04	0.04	0.00	0.00
Kaloko	QC-G6	2/23/2005	3.87		1.11		107.8		0.19		6.72		0.54		3.99	
	QC-G6	2/23/2005	3.7		1.13		92.4		0.14		6.24		0.54		3.47	
	QC-G6	2/23/2005	3.95		1.6		96.4		0.18		6.84		0.58		3.47	
		MEAN	3.84		1.28		98.87		0.17		6.60		0.55		3.64	
		RSD	0.13	0.03	0.28	0.22	7.99	0.08	0.03	0.16	0.32	0.05	0.02	0.04	0.30	0.08
Aimakapa	QC-A41	2/23/2005	2.06		<0.1		433		0.99		30.63		1.77		24.26	
	QC-A41	2/23/2005	2.2		<0.1		525.8		1.21		29.58		2.27		24.96	
	QC-A41	2/23/2005	1.84		<0.1		514.8		1.18		29.07		2.18		28.42	
		MEAN	2.03				491.20		1.13		29.76		2.07		25.88	
		RSD	0.18	0.09		0	50.70	0.10	0.12	0.11	0.80	0.03	0.27	0.13	2.23	0.09
Kaloko	QC-F17	3/15/2005	2.15		10.59		294.6		0.67		26.73		0.94		0.59	
	QC-F17	3/15/2005	2.98		11.67		298.6		0.66		25.05		0.95		0.73	
	QC-F17	3/15/2005	3.22		11.43		297.4		0.64		23.67		0.93		0.54	
		MEAN	2.78		11.23		296.87		0.66		25.15		0.94		0.62	
		RSD	0.56	0.20	0.57	0.05	2.05	0.01	0.02	0.02	1.53	0.06	0.01	0.01	0.10	0.16

Appendix C. (continued).

Kaloko	QC-G6	3/15/2005	0.99		7.63		199.6		0.75		19.83		0.96		0.14
	QC-G6	3/15/2005	0.7		9.1		199.6		0.73		20.83		0.96		0.12
	QC-G6	3/15/2005	0.92		8.17		197.2		1.01		21.03		0.95		0.11
	MEAN		0.87		8.30		198.80		0.83		20.56		0.96		0.12
	RSD		0.15	0.17	0.74	0.09	1.39	0.01	0.16	0.19	0.64	0.03	0.01	0.01	0.02 0.13
Aimakapa	QC-A41	3/15/2005	3.03		<0.1		492.4		1.05		36.57		2.13		2.21
	QC-A41	3/15/2005	3.44		<0.1		499		1.06		32.31		2.17		2.28
	QC-A41	3/15/2005	3.26		<0.1		495.2		1.04		32.31		2.13		3.71
	MEAN		3.24		<0.1		495.53		1.05		33.73		2.14		2.73
	RSD		0.21	0.06	0.01	0	3.31	0.01	0.01	0.01	2.46	0.07	0.02	0.01	0.85 0.31
Kaloko	QC-F17	4/27/2005	4.17		14.69		283.8		0.85		33.52		1.16		1.43
	QC-F17	4/27/2005	3.6		15.02		281		0.85		35.08		1.16		1.07
	QC-F17	4/27/2005	4.08		14.1		283.4		0.86		34.76		1.16		1.23
	MEAN		3.95		14.60		282.73		0.853		34.453				1.24
	RSD		0.31	0.08	0.47	0.03	1.51	0.01	0.01	0.01	0.82	0.02			0.18 0.14
Kaloko	QC-G6	4/27/2005	5.86		3.55		53.4		0.63		21.84		0.88		0.67
	QC-G6	4/27/2005	6.07		2.98		54		0.65		24.75		0.87		0.71
	QC-G6	4/27/2005	5.65		3.1		55		0.65		28.47		0.87		0.68
	MEAN		5.86		3.21		54.13		0.64		25.02		0.87		0.69
	RSD		0.21	0.04	0.30	0.09	0.81	0.01	0.01	0.02	3.32	0.13	0.01		0.02 0.03
Aimakapa	QC-A41	4/27/2005	4.17		1.47		477.6		0.88		32.61		1.77		11.17
	QC-A41	4/27/2005	3.6		1.69		487.47		0.89		32.88		1.8		14.15
	QC-A41	4/27/2005	4.08		2.03		487.6		0.89		38.31		1.79		17.50
	MEAN		3.95		1.73		484.22		0.89		34.6		1.79		14.27
	RSD		0.31	0.08	0.28	0.16	5.74	0.01	0.01	0.01	3.22	0.09	0.02	0.01	3.17 0.22
Kaloko	QC-F17	5/18/2005	2.24		20.55		506.00		0.18		24.35		0.42		3.99
	QC-F17	5/18/2005	3.16		20.28		508.80		0.18		31.1		0.46		3.47
	QC-F17	5/18/2005	2.22		20.85		502.40		0.18		32.35		0.51		3.47
	MEAN		2.54		20.56		505.73		0.18		29.27		0.46		3.64
	RSD		0.54	0.21	0.29	0.01	3.21	0.01	0.00	0.00	4.30	0.15	0.05	0.10	0.30 0.08
Kaloko	QC-G6	5/18/2005	2.12		5.38		382.20		0.24		7.80		0.50		2.66
	QC-G6	5/18/2005	1.88		5.06		374.80		0.25		8.73		0.51		2.66
	QC-G6	5/18/2005	1.58		4.94		377.60		0.24		9.54		0.49		2.66
	MEAN		1.86		5.13		378.20		0.24		8.69		0.50		2.66
	RSD		0.27	0.15	0.23	0.04	3.74	0.01	0.01	0.02	0.87	0.10	0.01	0.02	0.00 0.00

Appendix C. (continued).

Aimakapa	QC-A41	5/18/2005	2.28		2.83		467.00		0.8		34.32		2.09		12.13	
	QC-A41	5/18/2005	2.85		3.29		469.40		0.83		32.64		2.08		12.48	
	QC-A41	5/18/2005	2.37		3.78		481.60		0.83		35.88		2.1		14.21	
	MEAN		2.50		3.30		472.67		0.82		34.28		2.09		12.94	
	RSD		0.31	0.12	0.48	0.14	7.83	0.02	0.02	0.02	1.62	0.05	0.01	0.00	1.11	0.09
Kaloko	QC-F17	7/20/2005	3.64		1.95		336.60		0.58		20.01		1.38		20.45	
	QC-F17	7/20/2005	4.35		2.44		333.00		0.59		29.58		1.35		19.06	
	QC-F17	7/20/2005	4.1		2.68		348.20		0.58		24.81		0.96		19.52	
	MEAN		4.03		2.36		339.27		0.58		24.80		1.23		19.68	
	RSD		0.36	0.09	0.37	0.16	7.94	0.02	0.01	0.01	4.79	0.19	0.23	0.19	0.71	0.04
Kaloko	QC-G6	7/20/2005	0.76		1.40		160.60		0.54		23.70		1.00		2.08	
	QC-G6	7/20/2005	2.60		1.93		160.80		0.55		18.00		1.01		3.47	
	QC-G6	7/20/2005	1.46		1.96		171.20		0.61		21.33		1.03		3.26	
	MEAN		1.61		1.76		164.20		0.57		21.01		1.01		2.94	
	RSD		0.93	0.58	0.32	0.18	6.06	0.04	0.04	0.07	2.86	0.14	0.02	0.02	0.75	0.26
Aimakapa	QC-A41	7/20/2005	3.69		0.96		575.60		0.98		26.85		2.42		6.39	
	QC-A41	7/20/2005	3.17		0.99		584.80		0.98		29.37		2.22		5.97	
	QC-A41	7/20/2005	4.42		1.01		577.40		0.99		31.89		2.21		9.8	
	MEAN		3.76		0.99		579.27		0.98		29.37		2.28		7.39	
	RSD		0.63	0.17	0.03	0.03	4.88	0.01	0.01	0.01	2.52	0.09	0.12	0.05	2.10	0.28
Kaloko	QC-F17	8/25/2005	5.75		41.22		437.80		1.27		75.15		1.59		6.24	
	QC-F17	8/25/2005	5.62		39.09		433.20		1.22		81.45		1.55		5.55	
	QC-F17	8/25/2005	4.45		39.54		438.00		1.24		79.55		1.61		7.66	
	MEAN		5.27		39.95		436.33		1.24		78.72		1.58		6.48	
	RSD		0.72	0.14	1.12	0.03	2.72	0.01	0.03	0.02	3.23	0.04	0.03	0.02	1.08	0.17
Kaloko	QC-G6	8/25/2005	5.63		14.78		309.60		0.46		44.48		0.56		15.60	
	QC-G6	8/25/2005	4.48		14.70		314.00		0.47		44.44		0.56		16.22	
	QC-G6	8/25/2005	6.44		14.67		317.80		0.39		46.76		0.58		14.22	
	MEAN		5.52		14.72		313.80		0.44		45.23		0.57		15.35	
	RSD		0.98	0.18	0.06	0.00	4.10	0.01	0.04	0.10	1.33	0.03	0.01	0.02	1.02	0.07
Aimakapa	QC-A41	8/25/2005	2.91		10.98		476.60		1.73		48.06		2.60		4.99	
	QC-A41	8/25/2005	4.53		11.19		492.40		1.73		54.27		2.66		4.44	
	QC-A41	8/25/2005	2.92		11.78		493.80		1.79		55.92		2.62		4.44	
	MEAN		3.45		11.32		487.60		1.75		52.75		2.63		4.62	
	RSD		0.93	0.27	0.41	0.04	9.55	0.02	0.03	0.02	4.14	0.08	0.03	0.01	0.32	0.07

Appendix C. (continued).

Kaloko	QC-F17	9/20/2005	3.30		19.98		489.20		1.35		63.00		2.21		5.55	
	QC-F17	9/20/2005	3.39		22.35		480.00		1.38		64.68		2.28		4.39	
	QC-F17	9/20/2005	3.64		23.85		482.20		1.37		65.88		2.29		4.28	
		MEAN	3.44		22.06		483.80		1.37		64.52		2.26		4.74	
		RSD	0.18	0.05	1.95	0.09	4.80	0.01	0.02	0.01	1.45	0.02	0.04	0.02	0.70	0.15
Kaloko	QC-G6	9/20/2005	12.53		36.96		410.40		1.61		71.19		2.45		7.49	
	QC-G6	9/20/2005	12.36		38.61		409.00		1.66		69.44		2.46		6.24	
	QC-G6	9/20/2005	11.62		35.40		410.60		1.64		72.52		2.49		6.24	
		MEAN	12.17		36.99		410.00		1.64		71.05		2.47		6.66	
		RSD	0.48	0.04	1.61	0.04	0.87	0.00	0.03	0.02	1.54	0.02	0.02	0.01	0.72	0.11
Aimakapa	QC-A41	9/20/2005	11.86		35.56		579.20		2.12		79.20		4.04		1.2	
	QC-A41	9/20/2005	12.42		38.78		573.40		2.09		74.64		3.85		1.2	
	QC-A41	9/20/2005	10.31		39.08		574.80		2.12		78.12		4.03		1.2	
		mean	11.53		37.81		575.80		2.11		77.32		3.97		1.20	
		s.d.	1.09	0.09	1.95	0.05	3.03	0.01	0.02	0.01	2.38	0.03	0.11	0.03	0.00	0.00
Kaloko	QC-F17	10/21/2005	5.20		40.24		473.60		1.95		55.98		2.16		3.58	
	QC-F17	10/21/2005	5.53		40.12		472.60		1.95		52.74		2.13		3.93	
	QC-F17	10/21/2005	5.67		40.20		472.80		1.93		50.28		2.08		3.47	
		MEAN	5.47		40.19		473.00		1.94		53.00		2.12		3.66	
		RSD	0.24	0.04	0.06	0.00	0.53	0.00	0.01	0.01	2.86	0.05	0.04	0.02	0.24	0.07
Kaloko	QC-G6	10/21/2005	6.12		10.18		317.20		0.57		24.68		0.80		9.01	
	QC-G6	10/21/2005	5.85		9.40		309.40		0.59		25.76		0.80		8.67	
	QC-G6	10/21/2005	5.01		9.60		320.60		0.60		26.28		0.77		8.32	
		MEAN	5.66		9.73		315.73		0.59		25.57		0.79		8.67	
		RSD	0.58	0.10	0.41	0.04	5.74	0.02	0.02	0.03	0.82	0.03	0.02	0.02	0.35	0.04
Aimakapa	QC-A41	10/21/2005	7.97		13.20		554.40		2.61		56.61		3.73		1.57	
	QC-A41	10/21/2005	7.85		12.00		567.20		2.69		52.14		3.20		1.76	
	QC-A41	10/21/2005	7.77		12.72		567.40		2.62		51.78		3.27		1.57	
		MEAN	7.86		12.64		563.00		2.64		53.51		3.40		1.63	
		RSD	0.10	0.01	0.60	0.05	7.45	0.01	0.04	0.02	2.69	0.05	0.29	0.08	0.11	0.07
Kaloko	QC-F17	12/7/2005	5.07		23.8		380.8		1.44		46.48		1.71		4.12	
	QC-F17	12/7/2005	5.1		24.4		385		1.44		50.92		1.72		3.58	
	QC-F17	12/7/2005	5.13		23.96		384		1.45		59.92		1.77		4.39	
		MEAN	5.10		24.05		383.27		1.44		52.44		1.73		4.03	
		RSD	0.03	0.01	0.31	0.01	2.19	0.01	0.01	0.00	6.85	0.13	0.03	0.02	0.41	0.10

Appendix C. (continued).

Kaloko	QC-G6	12/7/2005	2.24		12.14		219.60		1.05		28.22		1.26		3.36	
	QC-G6	12/7/2005	2.04		12.47		216.60		1.03		29.30		1.29		3.81	
	QC-G6	12/7/2005	3.14		12.79		209.00		1.04		28.94		1.29		3.35	
		MEAN	2.47		12.47		215.07		1.04		28.82		1.28		3.51	
		RSD	0.59	0.24	0.33	0.03	5.46	0.03	0.01	0.01	0.55	0.02	0.02	0.01	0.26	0.08
Aimakapa	QC-A41	12/7/2005	5.80		9.79		543.20		2.31		59.60		3.30		7.86	
	QC-A41	12/7/2005	5.70		9.58		564.80		2.28		58.44		3.21		6.93	
	QC-A41	12/7/2005	5.12		9.37		553.40		2.30		55.64		3.23		7.39	
		MEAN	5.54		9.58		553.80		2.30		57.89		3.25		7.39	
		RSD	0.37	0.07	0.21	0.02	10.81	0.02	0.02	0.01	2.04	0.04	0.05	0.01	0.46	0.06
Kaloko	QC-F17	1/11/2006	2.31		3.53		323.20		0.43		27.68		0.86		6.24	
	QC-F17	1/11/2006	1.84		3.72		320.20		0.41		25.16		0.85		7.16	
	QC-F17	1/11/2006	1.75		3.75		323.20		0.45		25.44		0.87		8.78	
		MEAN	1.97		3.67		322.20		0.43		0.86		0.86		7.39	
		RSD	0.30	0.15	0.12	0.03	1.73	0.01	0.02	0.05	0.01	0.01	0.01	0.01	1.29	0.17
Kaloko	QC-G6	1/11/2006	1.56		0.10		175.00		0.39		17.55		0.67		6.86	
	QC-G6	1/11/2006	1.59		0.10		173.20		0.40		16.86		0.67		7.63	
	QC-G6	1/11/2006	1.36		0.10		174.00		0.41		16.77		0.65		6.70	
		MEAN	1.50		0.10		174.07		0.40		17.06		0.66		7.06	
		RSD	0.13	0.08	0.00	0.00	0.90	0.01	0.01	0.03	0.43	0.03	0.01	0.02	0.49	0.07
Aimakapa	QC-A41	1/11/2006	2.12		3.20		497.20		1.38		46.8		2.26		9.43	
	QC-A41	1/11/2006	2.17		4.45		499.20		1.4		51.56		2.33		6.93	
	QC-A41	1/11/2006	2.28		5.07		499.20		1.38		47.88		2.28		7.39	
		MEAN	2.19		4.24		498.53		1.39		48.75		2.29		7.92	
		RSD	0.08	0.04	0.95	0.22	1.15	0.00	0.01	0.01	2.50	0.05	0.04	0.02	1.33	0.17
Kaloko	QC-F17	2/21/2006	1.04		33.28		485.60		1.63		57.84		1.88		2.61	
	QC-F17	2/21/2006	1.13		35.12		488.40		1.61		70.72		1.93		2.60	
	QC-F17	2/21/2006	1.45		34.68		477.60		1.63		69.68		1.97		2.24	
		MEAN	1.21		34.36		483.87		1.62		1.93		1.93		2.48	
		RSD	0.22	0.18	0.96	0.03	5.60	0.01	0.01	0.01	0.05	0.02	0.05	0.02	0.21	0.08
Kaloko	QC-G6	2/21/2006	0.82		14.17		364.60		0.71		41.70		1.10		8.74	
	QC-G6	2/21/2006	1.72		14.34		364.20		0.70		43.25		1.10		7.80	
	QC-G6	2/21/2006	1.42		14.79		370.20		0.74		38.50		1.09		8.03	
		MEAN	1.32		14.43		366.33		0.72		41.15		1.10		8.19	
		RSD	0.46	0.35	0.32	0.02	3.35	0.01	0.02	0.03	2.42	0.06	0.01	0.01	0.49	0.06

Appendix C. (continued).

Aimakapa	QC-A41	2/21/2006	4.63		0.10		491.20		0.79		48.16		2.24		8.51	
	QC-A41	2/21/2006	8.66		0.10		489.60		0.69		70.08		1.96		8.03	
	QC-A41	2/21/2006	4.75		0.10		491.00		0.69		52.48		2.02		8.51	
		MEAN	6.01		0.10		490.60		0.72		56.90667		2.07		8.35	
		RSD	2.29	0.38	0.00	0.00	0.87	0.00	0.06	0.08	11.61	0.20	0.15	0.07	0.27	0.03
Kaloko	QC-F17	4/11/2006	0.13		51.84		486.00		0.41		81.36		0.75		9.22	
	QC-F17	4/11/2006	0.13		52.89		484.40		0.41		82.86		0.81		10.28	
	QC-F17	4/11/2006	0.13		51.78		487.00		0.43		85.74		0.84		10.64	
		MEAN	0.13		52.17		485.80		0.42		0.80		0.80		10.05	
		RSD	0.00	0.00	0.62	0.01	1.31	0.00	0.01	0.03	0.05	0.06	0.05	0.06	0.74	0.07
Kaloko	QC-G6	4/11/2006	2.36		0.10		332.80		0.30		24.36		0.58		10.87	
	QC-G6	4/11/2006	1.95		0.10		329.40		0.33		26.13		0.70		10.40	
	QC-G6	4/11/2006	2.21		0.10		330.40		0.32		25.29		0.69		10.16	
		MEAN	2.17		0.10		330.87		0.32		25.26		0.66		10.48	
		RSD	0.21	0.10	0.00	0.00	1.75	0.01	0.02	0.05	0.89	0.04	0.07	0.10	0.36	0.03
Aimakapa	QC-A41	4/11/2006	2.61		0.10		433.80		0.28		0.80		27.12		14.18	
	QC-A41	4/11/2006	2.38		0.10		435.40		0.29		0.87		29.36		13.23	
	QC-A41	4/11/2006	2.77		0.10		423.40		0.32		0.91		30.80		15.12	
		MEAN	2.59		0.10		430.87		0.30		0.86		29.09		14.18	
		RSD	0.20	0.08	0.00	0.00	6.52	0.02	0.02	0.07	0.06	0.06	1.85	0.06	0.95	0.07
Kaloko	QC-F17	5/25/2006	2.72		3.53		245.80		0.26		31.76		0.42		10.63	
	QC-F17	5/25/2006	3.23		2.84		355.80		0.23		28.44		0.43		9.92	
	QC-F17	5/25/2006	2.88		3.61		387.40		0.23		33.56		0.43		10.63	
		MEAN	2.94		3.33		329.67		0.24		0.43		0.43		10.40	
		RSD	0.26	0.09	0.42	0.13	74.33	0.23	0.02	0.07	0.01	0.01	0.01	0.01	0.41	0.04
Kaloko	QC-G6	5/25/2006	2.23		15.32		431.60		0.44		38.25		0.63		5.43	
	QC-G6	5/25/2006	2.27		14.64		334.20		0.54		46.05		0.63		5.20	
	QC-G6	5/25/2006	2.10		16.16		382.00		0.44		50.45		0.70		6.14	
		MEAN	2.20		15.37		382.60		0.47		44.92		0.65		5.59	
		RSD	0.09	0.04	0.76	0.05	48.70	0.13	0.06	0.12	6.18	0.14	0.04	0.06	0.49	0.09
Aimakapa	QC-A41	5/25/2006	2.77		0.10		451.8		0.43		27.96		1.00		12.27	
	QC-A41	5/25/2006	2.54		0.10		445.6		0.47		25.11		1.02		15.60	
	QC-A41	5/25/2006	2.55		0.10		413.0		0.42		26.10		0.95		12.76	
		MEAN	2.62		0.1		436.8		0.44		26.39		0.99		13.54	
		RSD	0.13	0.05	0.00	0.00	20.84	0.05	0.03	0.06	1.45	0.05	0.04	0.04	1.80	0.13

Appendix C. (continued).

Kaloko	QC-F17	6/30/2006	4.12		24.06		401.8		1.89		58.38		2.46		14.53	
	QC-F17	6/30/2006	4.6		23.88		431.6		1.77		49.68		2.33		11.62	
	QC-F17	6/30/2006	4.69		24.06		417.8		1.89		50.88		2.35		10.17	
		MEAN	4.47		24		417.1		1.85		52.98		2.38		12.11	
		RSD	0.31	0.07	0.10	0.00	14.91	0.04	0.07	0.04	4.71	0.09	0.07	0.03	2.22	0.18
Kaloko	QC-G6	6/30/2006	4.44		0.10		292.80		0.70		16.38		1.17		41.16	
	QC-G6	6/30/2006	5		0.10		292.80		0.75		18.00		1.37		43.58	
	QC-G6	6/30/2006	5.03		0.10		276.60		0.86		19.59		1.64		46	
		MEAN	4.92		0.10		287.40		0.77		17.99		1.39		43.58	
		RSD	0.44	0.09	0.00	0.00	9.35	0.03	0.08	0.11	1.61	0.09	0.24	0.17	2.42	0.06
Aimakapa	QC-A41	6/30/2006	4.29		0.10		511.60		1.04		20.07		1.80		12.2	
	QC-A41	6/30/2006	4.25		0.10		520.00		1.09		21.87		1.79		11.61	
	QC-A41	6/30/2006	4.27		0.10		560.00		1.08		23.37		1.83		12.2	
		MEAN	4.27		0.1		530.53		1.07		21.77		1.81		12.00	
		RSD	0.02	0.00	0.00	0.00	25.86	0.05	0.03	0.02	1.65	0.08	0.02	0.01	0.34	0.03
Kaloko	QC-F17	8/1/2006	2.72		0.10		446.40		0.53		19.12		0.92		23.06	
	QC-F17	8/1/2006	2.75		0.10		445.80		0.58		19.12		0.95		29.76	
	QC-F17	8/1/2006	2.31		0.10		451.00		0.59		17.76		0.95		30.5	
		MEAN	2.59		0.10		447.73		0.57		18.67		0.94		27.77	
		RSD	0.25	0.09	0.00	0.00	2.84	0.01	0.03	0.06	0.79	0.04	0.02	0.02	4.10	0.15
Kaloko	QC-G6	8/1/2006	2.11		1.33		371.80		0.59		19.65		1.23		21.58	
	QC-G6	8/1/2006	1.92		1.50		380.80		0.59		16.56		1.25		21.58	
	QC-G6	8/1/2006	1.92		1.57		387.20		0.59		18.42		1.31		21.58	
		MEAN	1.98		1.47		379.93		0.59		18.21		1.26		21.58	
		RSD	0.11	0.06	0.12	0.08	7.74	0.02	0.00	0.00	1.56	0.09	0.04	0.03	0.00	0.00
Aimakapa	QC-A41	8/1/2006	2.19		1.26		482.40		1.62		30.00		2.62		12.2	
	QC-A41	8/1/2006	2.01		1.18		468.60		1.58		30.99		2.54		11.9	
	QC-A41	8/1/2006	1.6		0.92		477.20		1.54		30.90		2.55		10.12	
		MEAN	1.93		1.12		476.07		1.58		30.63		2.57		11.41	
		RSD	0.30	0.16	0.18	0.16	6.97	0.01	0.04	0.03	0.55	0.02	0.04	0.02	1.12	0.10

Appendix D. Sampling Times for all stations and parameters during the July 2004 to August 2006 – Sampling Times. NaN=Not a Number.

		9/30/2004	12/15/2004	1/12/2005	2/23/2005	3/16/2005	4/27/2005	5/18/2005	7/20/2005	8/25/2005	9/20/2005	10/20/2005	12/7/2005	1/11/2006	2/21/2006	4/11/2006	5/25/2006	6/30/2006	8/1/2006
Aimakapa	21	8:42:38	13:36:18	9:28:32	10:44:43	10:17:41	9:31:23	8:59:12	9:16:35	9:09:15	9:07:02	9:51:00	8:55:38	10:19:38	9:14:15	10:13:00	8:40:16	8:24:33	10:54:10
Aimakapa	25	8:46:58	13:32:07	8:53:27	10:24:18	9:45:32	9:26:14	8:49:22	9:08:41	8:42:24	8:43:07	9:46:41	8:46:47	10:13:32	9:11:16	10:10:00	8:30:27	8:21:38	10:42:37
Aimakapa	34	8:50:05	13:30:26	8:55:28	10:26:16	9:47:07	9:23:58	8:51:25	9:06:08	8:44:45	8:44:30	9:43:54	8:45:28	10:12:29	9:09:51	10:08:00	8:28:24	8:19:39	10:39:57
Aimakapa	38	8:26:38	12:58:34	8:42:30	10:15:17	10:20:14	8:46:22	8:37:18	8:27:08	8:31:19	8:35:47	9:08:33	8:27:10	9:34:14	8:40:47	9:40:00	7:48:53	7:51:02	10:04:25
Aimakapa	39	8:32:09	13:03:47	8:45:57	10:17:47	9:39:58	8:51:22	8:40:34	8:31:12	8:34:23	8:33:59	9:13:20	8:29:41	9:38:12	8:43:45	9:42:00	7:52:22	7:54:03	10:08:07
Aimakapa	40	8:35:03	13:05:06	9:31:37	10:19:10	9:41:26	8:55:05	8:41:47	8:32:40	8:35:53	8:38:27	9:11:56	8:30:54	9:39:41	8:44:47	9:45:00	7:54:10	7:55:24	10:11:44
Aimakapa	41	8:38:33	13:11:39	8:49:46	10:20:50	9:43:15	8:58:03	8:43:03	8:34:28	8:39:04	8:39:52	9:15:14	8:32:29	9:42:26	8:46:08	9:47:00	7:56:11	7:56:52	10:14:11
Aimakapa	45	8:54:14	13:26:24	8:58:55	10:28:58	10:12:56	9:20:44	8:54:29	8:58:05	8:49:31	8:49:05	9:17:57	8:50:47	10:06:38	9:07:09	10:03:00	8:04:04	8:17:10	10:36:13
Aimakapa	51	9:15:59	13:17:56	9:11:20	10:34:39	9:58:17	9:12:38	9:16:19	8:47:00	8:56:17	8:56:39	9:39:12	8:38:39	9:55:51	8:59:35	9:53:00	8:19:07	8:10:52	10:27:36
Aimakapa	52	9:22:19	13:22:33	9:05:55	10:32:17	10:08:44	9:15:13	9:19:51	8:51:43	8:53:29	8:53:06	9:22:15	8:43:29	9:58:33	9:03:34	9:59:00	8:07:17	8:13:23	10:30:38
Aimakapa	59	9:07:58	13:09:06	9:17:31	10:39:37	10:04:48	9:04:06	9:10:01	8:38:35	9:03:39	9:03:14	9:34:02	8:35:27	9:50:29	8:51:42	9:50:00	8:10:52	8:00:33	10:19:35
Aimakapa	60	9:02:54	13:14:28	9:14:19	10:36:51	10:01:30	9:09:45	9:13:57	8:43:21	8:59:04	8:59:50	9:29:45	8:40:36	9:53:39	8:56:45	9:55:00	8:41:07	8:03:45	10:24:39
Pools	11	NaN	NaN	9:12:46	11:14:00	10:06:16	9:07:33	9:08:17	10:17:22	8:53:50	9:15:28	9:25:39	9:45:52	11:10:35	10:25:03	10:52:23	NaN	9:12:45	11:20:45
Pools	13	12:20:47	9:11:14	9:17:56	11:58:05	10:02:23	9:04:28	9:04:29	10:14:51	9:04:38	9:10:33	9:36:22	9:50:17	10:28:38	10:16:18	10:59:22	NaN	9:01:30	11:12:12
Pools	14	12:15:03	9:15:52	9:22:24	11:44:00	9:57:16	9:00:05	8:58:25	10:12:12	9:14:45	9:04:27	9:31:59	9:54:44	10:32:37	10:11:19	11:04:52	8:48:07	8:55:20	11:08:00
Pools	15	12:05:11	9:33:14	9:45:56	11:37:20	9:46:19	8:48:45	8:47:16	9:56:52	10:04:02	8:47:39	9:27:55	10:05:52	10:52:23	10:03:02	11:31:55	NaN	8:45:27	10:56:14
Pools	16	11:52:37	9:25:16	9:34:06	11:22:00	9:37:41	8:31:54	8:34:10	9:49:58	9:35:43	8:33:19	9:14:08	10:11:53	10:41:22	9:51:19	11:20:11	8:29:14	8:28:25	10:44:40
Pools	17	11:59:19	9:29:10	9:40:59	11:30:05	9:41:41	8:40:44	8:41:42	NaN	9:50:56	8:52:16	9:02:06	10:19:24	10:47:51	9:57:06	NaN	8:20:30	8:36:46	10:50:54
Pools	34	11:40:22	9:20:03	9:26:17	11:51:14	9:54:14	8:55:40	8:53:28	10:07:01	9:24:08	9:00:12	9:05:52	9:59:29	11:06:48	10:19:54	11:08:51	9:40:48	9:06:05	11:16:52
Pools	123	NaN	NaN	10:18:28	12:38:15	12:54:27	9:35:27	10:21:15	10:47:17	10:06:50	10:12:45	9:21:54	10:37:02	11:49:29	10:30:46	11:10:00	7:34:26	6:57:08	12:09:57
Kaloko	F17	NaN	10:53:45	8:03:34	10:13:25	10:44:01	9:59:28	8:56:29	8:34:59	7:51:45	7:37:04	10:54:44	8:55:45	9:41:27	8:53:23	10:04:44	7:35:50	6:58:26	9:57:12
Kaloko	G18	NaN	11:03:52	8:07:21	10:17:32	10:45:52	10:01:40	9:06:18	8:37:52	7:55:11	7:39:33	8:15:56	9:01:40	9:43:21	8:49:13	10:01:26	7:23:29	6:47:48	9:58:47
Kaloko	G6	NaN	10:39:39	8:13:46	10:04:37	10:51:49	10:09:47	8:59:29	8:45:48	7:40:03	7:46:35	8:04:15	8:48:54	9:31:51	9:02:30	9:48:54	7:26:39	6:50:57	9:45:54
Kaloko	J10	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	8:07:57	8:41:27	9:34:37	9:11:46	9:53:30	7:17:34	6:44:20	9:49:13
Kaloko	M6	NaN	10:25:41	8:18:14	9:47:50	10:57:28	9:50:27	9:12:17	8:49:14	7:35:02	7:50:18	7:57:06	8:24:33	9:23:45	9:14:23	9:31:23	7:15:37	6:42:02	9:41:18
Kaloko	O6	NaN	11:49:25	8:21:39	9:54:36	10:58:50	9:44:47	9:14:19	8:50:50	8:01:53	7:51:59	7:59:35	8:22:48	9:26:27	9:15:53	10:12:02	7:52:02	7:12:50	9:37:44
Kaloko	Q3	NaN	12:07:36	8:31:05	10:43:40	11:05:28	10:27:00	10:25:00	9:11:36	8:08:14	8:01:43	8:30:05	9:17:06	9:58:59	9:22:41	10:22:39	10:05:19	9:23:01	10:17:01
Wells	4061-01	NaN	NaN	13:02:03	15:25:59	12:37:46	12:06:53	12:06:14	13:31:03	10:27:44	10:29:15	12:01:49	10:58:10	12:11:22	10:49:32	11:28:00	11:02:54	9:55:47	12:37:26
Wells	4161-01	NaN	NaN	12:42:39	15:45:35	12:07:01	11:45:38	11:43:05	12:46:55	11:05:00	11:02:27	11:17:31	10:03:53	12:52:35	11:17:35	11:51:00	10:36:05	10:19:31	13:34:49
Wells	4161-02	NaN	NaN	12:20:44	16:03:18	12:22:56	11:27:21	11:23:45	12:19:40	10:48:02	10:45:43	12:25:14	9:43:53	12:32:13	11:34:24	12:10:00	NaN	10:42:50	13:09:31

Appendix E. HPLC Pigment Results from Kaloko (G6, F17) and Aimakapa (A41), fishponds within Kaloko-Honokohau Historical National Park. NaN = Not a Number.

Month	Station ID	CHLDA	CHLC	PER	BUT	FUCO	HEX	PRASINO	VIOLA	DDX	ALLOX	LUT	ZEAX	CHLB	A-CAR	B-CAR	DV-CHLA	MV-CHLA	TOTCHLA
5-Jan	A41	655.14	1705	166.91	0	4789.66	338.02	62.48	71.25	1565.13	364.8	0	6091.08	318.34	132.65	1879.21	0	14594.07	14594.07
5-Jan	G6	24.77	134.14	15.08	0	210.31	45.77	45.32	10.08	33.95	70.84	0	300.32	301.26	22.44	120.12	0	1311.84	1311.84
5-Jan	F17	59.61	245.25	88.92	0	234.36	83.05	114.84	35.42	63.7	216.97	0	598.71	674.01	69.2	264.92	0	2704.59	2704.59
5-Feb	A41	0.42	1.34	0.8	0	3.63	0.3	NaN	0.13	1.13	NaN	0.1	8.65	0.36	0.04	1.9	0.5	23.97	24.46
5-Feb	G6	0.43	1.02	0.05	0	2.17	0.4	NaN	0.1	0.1	NaN	0.1	0.2	0.1	0	0.2	0	5.63	5.63
5-Feb	F17	6.06	0.94	0.377	0	1.97	0.02	NaN	0.02	0.6	NaN	0.12	0.02	0.1	0.05	0.2	0	6.23	6.23
5-Mar	A41	0.61	1.2	0.68	0	3.08	0.3	NaN	0.4	1.2	NaN	0.54	6.92	1.96	0.4	1.97	0.75	24.48	25.22
5-Mar	G6	0.18	0.4	0.21	0	0.52	0.2	NaN	0.3	0.3	NaN	0.02	0.2	0.2	0.01	0.12	0.1	2.37	2.37
5-Mar	F17	0.44	0.55	0.2	0	0.8	0.2	NaN	0.5	0.4	NaN	0.4	0.45	0.39	0.1	0.23	0.03	3.34	3.37
5-Apr	A41	0.46	1.24	0.73	0	2.05	0.03	NaN	0.13	1.91	NaN	0.16	3.93	0.93	0.04	1.17	0.36	15.93	16.3
5-Apr	G6	0.03	0.13	0.01	0.01	0.23	0.01	NaN	0.01	0.03	NaN	0.01	0.29	0.1	0	0.08	0.03	1.35	1.38
5-Apr	F17	0.41	0.47	0.22	0	0.43	0.03	NaN	0.11	0.27	NaN	0.16	0.57	0.97	0.02	0.35	0.03	3.78	3.81
5-May	A41	90.74	189.42	0	0	580.15	191.68	0	102.03	170.64	0	638.96	4996.48	1159.95	11.31	798.01	0	10580.9	10580.9
5-May	F17	505.66	197.3	0	0	522.03	929.77	0	592.85	172.27	0	1050.59	1116.85	7317.37	37.4	497.77	41.04	9632.86	9673.9
5-May	G6	854.55	620.8	0	90.91	897.93	106.83	0	44.4	597.34	0	57.97	186.92	366.36	10.23	150.82	0	3231.68	3231.68
5-Jul	A41	0	145.4	127.17	0	432.09	81.73	0	46.02	140.73	0	232.13	1800.26	866.45	24.51	412.61	0	6103.86	6103.86
5-Jul	F17	2263.13	2699.55	0	0	5723.6	632.37	0	57.17	729.52	0	129.4	436.72	717.74	13.57	603.2	0	18251.02	18251.02
5-Jul	G6	261.29	443.03	0	12.38	974.91	100.8	0	10.55	132.48	0	31.57	243.98	175.37	5.4	126.72	0	3684.54	3684.54
5-Aug	F17	0	591.97	0	0	1996.15	203.37	0	66.74	306.5	0	65.86	68.08	1033.04	14.31	246.41	0	7137.93	7137.93
5-Aug	G6	0	1798.79	0	0	3371.97	525.34	0	221	452.42	0	185.65	191.49	3391.15	31.64	492.62	0	15676.47	15676.47
5-Aug	A41	0	483.43	0	0	1046.45	81.86	0	0	164.02	0	174.85	1200.76	49.12	3.2	333.29	0	5456.03	5456.03
5-Sep	A41	0	50.73	0	0	168.39	14.84	0	12.92	40.49	0	248.66	2073.9	36.46	5.26	456.73	7.32	2454.9	2462.22
5-Sep	F17	0	670.8	0	0	1314.91	216.17	0	48.04	180.23	0	60.54	69.41	684.48	9.38	201.64	3.1	5187.91	5191.02
5-Sep	G6	123.62	592.14	0	0	1125.59	314.19	0	152.47	147.22	0	118.54	100.31	2320.63	14.84	261.75	120.53	6253.19	6373.72
5-Oct	F17	0	305.22	0	0	705.7	81.1	0	21.47	139.84	0	33.84	25.53	324.19	6.05	116.36	12.73	2702.9	2715.63
5-Oct	G6	244.53	929.82	0	0	2009.94	534.24	0	209.3	259.82	0	206.21	158.26	3113.78	21.86	399.8	156.1	8800.23	8956.33
5-Oct	A41	0	99.5	92.65	0	121.37	17.12	0	13.08	44	0	310.87	2030.27	34.09	5.84	421.7	0	2110.8	2110.8
5-Dec	A41	0	632.87	72.73	0	1472.98	134.69	0	21.93	325.41	0	234.49	1147.44	87.18	13.11	403.96	15.67	5748.06	5763.73
5-Dec	F17	96.19	188.45	0	19.45	398.29	339.49	0	276.56	159.16	19.26	201.56	312.46	1456.94	35.81	257.97	9.19	3613.85	3623.04
5-Dec	G6	59.53	247.68	0	0	444.06	222.88	0	134.38	133.63	74.31	103.6	274.32	966.17	33.51	189.95	10.96	3083.18	3094.14
6-Feb	A41	0	305.32	221.88	0	325.42	38.38	0	35.41	134.95	0	505.09	5935.34	208.75	12.9	1304.67	0	8529.22	8529.22
6-Feb	G17	0	268.71	99.16	0	449.26	282.98	0	7.41	119.1	0	70.15	697.99	225.36	11.16	186.43	0	3295.76	3295.76
6-Feb	G6	0	560.63	169.24	0	987.32	450.78	0	21.23	260.36	0	61.55	767.66	527.74	14.72	265.24	0	5414.12	5414.12
6-Apr	A41	0	307.89	0	0	925.53	240.94	0	126.9	433.82	0	1302.16	11917.38	719.63	28.78	2379.18	0	15012.24	15012.24
6-Apr	F17	1428.81	821.8	78.99	0	1703.14	209.8	0	45.83	798.09	0	192.7	216.63	309.87	5.86	433.62	34.28	6409.33	6443.61
6-Apr	G6	565.85	450.58	39.09	0	1014.42	100.82	0	41.93	442.81	0	63.91	246.34	148.77	5.7	279.07	12.72	4406.9	4419.62
6-May	A41	0	0	0	0	365.1	125.07	0	87.66	86.65	0	616.16	7627.51	409.47	39.02	2215.08	0	9554.46	9554.46
6-May	F17	1589.01	1688.73	182.67	0	2527.43	383.31	0	73.16	781.23	0	78.45	81.2	703.1	38.12	437.3	0	8938.16	8938.16
6-May	G6	361.81	512.5	287.09	0	970.26	169.78	0	76.92	434.06	0	55.25	65.58	519.26	31.41	256.5	0	4433.14	4433.14